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Soil-Embedded and Oil-Immersed Soil Stress Gage Calibration Tests

by Walton C. Dickson, Jon E. Windham

WES

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Prepared for Defense Special Weapons Agency

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U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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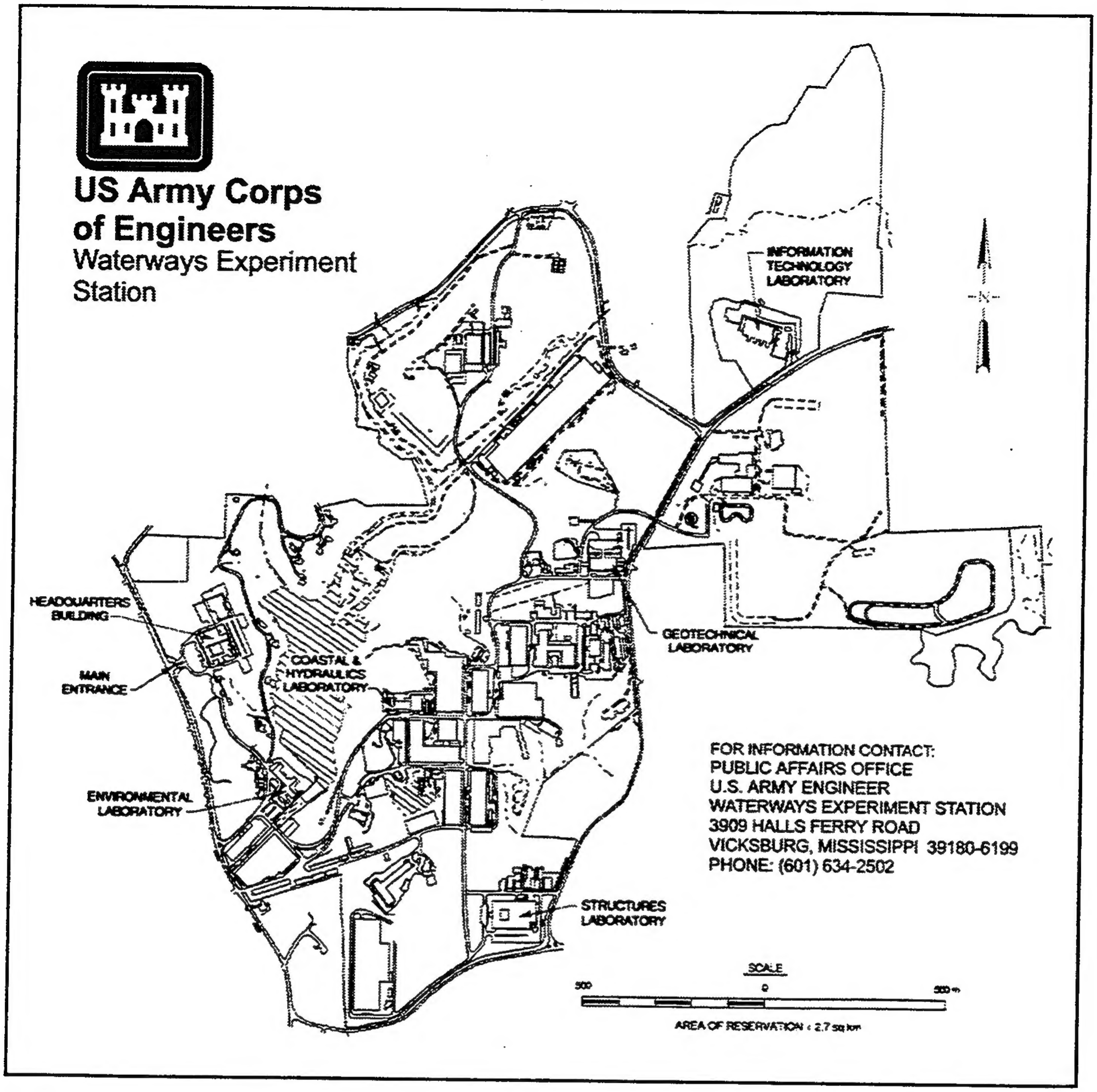

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Contents

Preface

The U.S. Army Engineer Waterways Experiment Station (WES) was tasked by the Defense Special Weapons Agency to research the factors affecting the measurement of stress in soil backfills during high-explosive test events. Laboratory calibration tests were conducted on soil stress gages embedded in flume sand, Yuma clayey sand, and Vicksburg loess (silty clay). Comparison tests were conducted on gages immersed in oil. This report documents the results of these tests. The work was funded by DSWA under Task Code RSRB, FY85 and FY86 Work Unit 00058, (Task 3): "In Situ Backfill Property Tests."

Responsibility for coordinating the overall program was assigned to Dr. Jon E. Windham, Geomechanics and Explosion Effects Division (GEED), Structures Laboratory (SL). The soil-embedded calibration tests were performed in the GEED Geodynamics Test Facility; the oil-immersed tests were conducted by the WES Instrumentation Services Division, Information Technology Laboratory. This report was prepared by Mr. Walton C. Dickson and Dr. Jon E. Windham, GEED. Dr. Jimmy P. Balsara was Chief, GEED, and Mr. Bryant Mather was Director, SL.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
inches	25.4	millimetres
pounds (force) per square inch	6.894757	kilopascals
pounds (mass) per cubic foot	16.01846	kilograms per cubic metre

1 Introduction

Background

The U.S. Army Engineer Waterways Experiment Station (WES) has conducted high-explosive (HE) field tests for many years. Soil stress measurements are used to determine or deduce many aspects of an HE test, hence, accurate calibration of soil stress gages is essential to proper interpretation of a test event. WES has typically calibrated the soil stress gages used in HE field tests hydrostatically (Ahmad 1985). The result of a hydrostatic calibration is linear for loading and unloading. Therefore, a one-step linear calibration has been used to convert the voltage output of a soil stress gage to a pressure. Unfortunately, soils do not typically behave as linear elastic materials. To the contrary, soil stress-strain behavior is usually nonlinear and hysteretic. Therefore, a calibration technique is needed to convert the voltage output of a soil stress gage to a pressure based upon the soil backfill material in which the gage is embedded.

WES was tasked by the Defense Special Weapons Agency (DSWA) to develop a technique to reduce field voltage records to stress records that accounts for the nonlinear-hysteretic response of soils. To accomplish this task, low-range and high-range soil stress gages were calibrated hydrostatically and also calibrated in three different soils. The output from some of these tests were measured in volts. Calibration tests were also conducted in which strain from each of the strain gages in the stress gages' sensing bridge circuit was directly recorded as output; the results of these tests can be compared with results from finite element gage-simulation calculations.

Purpose and Scope

The purpose of this report is to document the results of the calibration tests conducted on soil stress gages. A description of the soils used, the test equipment, and the test procedures are presented in Chapter 2. Results from the calibration tests are presented and compared in Chapter 3. Chapter 4 contains a summary.

2 Calibration Tests

Calibration tests were conducted on both low-range (to 30 MPa) and high-range (to 70 MPa) diaphragm-type soil stress gages, denoted LRSE and HRSE, respectively. Each type of gage was calibrated hydrostatically (immersed in oil) and also while embedded in three different soil backfill materials, i.e., flume sand, Yuma clayey sand, and Vicksburg loess (silty clay).

Soil Descriptions

Laboratory test programs have previously been documented for all three soils used in the soil-embedded gage calibrations. A summary of the classification and mechanical property test results for each soil type follows.

Flume sand

Laboratory test results for flume sand are well documented (Green 1986a). Flume sand is a light brown sand that classifies as SP using the Unified Soil Classification System (USCS) (U.S. Army Engineer Waterways Experiment Station 1960). A typical gradation curve for flume sand is shown on Figure 2.1; the specific gravity of flume sand is 2.64. Flume sand has a maximum dry density of 1.80 Mg/m^3 (112.3 pcf) and a minimum dry density of 1.50 Mg/m^3 (93.6 pcf). Target composition property values for the soil-embedded calibration tests were 1.62 Mg/m^3 (101.0 pcf) dry density and 5.0 percent water content. The uniaxial strain (UX) stress-strain relationship and the UX stress path for flume sand are shown on Figure 2.2.

Yuma clayey sand

Laboratory test results for Yuma clayey sand are also well documented (Cargile 1986). Yuma clayey sand is a reddish-brown material with a USCS classification of SC. A typical gradation curve for this material is shown on Figure 2.3. This material has a liquid limit (LL) of 48 and a plastic limit (PL) of 17; the specific gravity of Yuma clayey sand is 2.68. Compaction tests yielded a

standard proctor dry density of 1.95 Mg/m^3 (121.7 pcf) at an optimum water content of 11.6 percent and a modified proctor maximum dry density of 2.11 Mg/m^3 (131.7 pcf) at a optimum water content of 7.9 percent. Target values of dry density and water content for the calibration test samples were 1.84 Mg/m^3 (115.0 pcf) and 3.0 percent, respectively. The corresponding UX stress-strain relationship and UX stress path for Yuma clayey sand are shown on Figure 2.4.

Vicksburg loess (silty clay)

The material properties of this soil have been documented (Green 1986b). Vicksburg loess is a brownish soil that classifies as a silty clay (CL) using USCS. A typical gradation curve for this material is shown on Figure 2.5. Atterberg limits tests indicated a LL of 32 and a PL of 20. This silty clay has a specific gravity of 2.71. Compaction tests yielded a standard proctor maximum dry density of 1.72 Mg/m^3 (107.1 pcf) at an optimum water content of 16.2 percent and modified proctor maximum density of 1.84 Mg/m^3 (114.7 pcf) with an optimum water content of 13.7 percent. Shown on Figure 2.6 is the UX compressibility relationship and UX stress path for Vicksburg loess at the target dry density of 1.62 Mg/m^3 (101.0 pcf) and the target water content of 11.9 percent.

Soil Stress Gages

Two SE-type soil stress gages were used in the calibration tests, i.e., LRSE and HRSE gages. Both gages are manufactured by Kulite Semiconductor Products, Inc.

The LRSE gage is Kulite model no. LQ-080U with a range of 0 to 30 MPa; its design is well documented (Ingram 1967 and Ingram 1968). The gage is 0.225-in. thick and 1.20 in. in diameter. The active gage sensor consists of four strain gages attached to the diaphragms as shown on Figure 2.7. The gages are located so that the stress gage measures a single scalar response equal to the sum of the four strain gages, i.e.,

$$\epsilon_{TOTAL} = \epsilon_{TOP\ CENTER} - \epsilon_{TOP\ EDGE} + \epsilon_{BOTTOM\ CENTER} - \epsilon_{BOTTOM\ EDGE}$$

The gage is usually placed in an confining ring, shown on Figure 2.8, to prevent lateral loads from affecting the readings. A small annulus of RTV silicone rubber adhesive sealant is placed between the gage and the confining ring. This material significantly reduces the lateral load transfer into the gage.

The HRSE gage is Kulite model no. LQV-080-8U with a range from 0 to 70 MPa. The HRSE is basically a LRSE gage but with diaphragms that are twice as thick as the ones used in the LRSE gage (Welch 1982). A confining ring is used to reduce lateral loads and to increase the effective diameter of the gage. Again, RTV silicone rubber adhesive sealant is placed between the gage and the confining

ring. Figure 2.9 presents a cross-sectional view of the HRSE gage in its confining ring, and Figure 2.10 shows the plan view of the gage and confining ring.

General Calibration Procedures

The calibration of a gage consists of two parts (Denise 1987). The first part is electrical and consists of shunting a series of known resistors across a bridge circuit and measuring the voltage output. The result is the determination of the overall electrical resistance of the gage, R_g, and a factor, K, related to the gain used on the amplifier during that particular calibration.

The second part of the calibration is physical, in which a known stress is applied to the face of the gage and its electrical response is measured in terms of amplified voltage. The slope of the amplified voltage versus pressure curve is denoted as S. When this slope is multiplied by the K factor found in the electrical calibration, the product is the calibration constant of the gage, Ca.

Multiplying by the K factors is a normalization process, allowing the slopes of several different calibration curves to be compared even if the gain on the amplifier was different (i.e., different values of K). The end result is the same if the raw voltage data is first divided by K, and then the slope, S, is determined. In this way, different calibrations can be compared using numerical models other than a straight line.

Oil-Immersed Calibration Tests

Details of test equipment and procedures used by WES to conduct hydrostatic calibrations have been documented (Ahmad 1985). As listed in Table 2.1, 70 oil-immersed calibration tests were conducted in this study. Results from standard tests in which voltage output from the full bridge was measured for LRSE gages are shown on PLATES 1-13. Six LRSE gages were calibrated one time; an additional gage was calibrated seven times. Eleven HRSE gages were calibrated one time each and two gages were calibrated seven times each. The results of these calibration tests are displayed on PLATES 14-38.

In addition to the standard WES hydrostatic calibrations, tests were conducted in which strain from the individual strain gages in the bridge was directly recorded as output. Nomenclature for the individual strain gages is presented on Figure 2.11. The calibration tests were conducted in the same manner as the standard calibration test. Two LRSE gages were calibrated in this manner, as shown on PLATES 39-46. Two HRSE gages in which the individual strain gage measurements were recorded were calibrated three times each; results from these tests are given on PLATES 47-70.

Soil-Embedded Calibration Tests

Calibration tests were run with the stress gages embedded in compacted soil backfill specimens for comparison with the hydrostatic calibrations. Again, there was an electrical and a physical part to the calibration. The test device used for soil-embedded gage calibrations is shown in Figure 2.12. The wafer-shaped soil specimen was constructed by rodding the soil into the test chamber until it was half full. A soil stress gage was placed in the chamber, and then soil was rodded into the chamber until the sample was flush with the top of the base. A rubber membrane was placed over the sample, and hydraulic pressure was applied statically to the membrane and hence to the sample. The applied pressure and the resulting output (voltage or strain) from the embedded gage were recorded manually. The 187 soil-embedded calibrations listed in Table 2.2 included loading, unloading, and reloading cycles (see PLATES 71-257).

Calibration tests with voltage output were conducted on both LRSE and HRSE gages in flume sand. For both LRSE and HRSE gages, six gages were calibrated one time each and one gage was calibrated six times. The results of these 24 soil-embedded calibrations in flume sand are shown on PLATES 71-94. Flume sand-embedded calibration tests were also conducted with strain from each of the four strain gages in the wheatstone bridges of the LRSE or HRSE gages recorded directly. The strain output tests were conducted with the LRSE gages oriented in four ways as shown in Figure 2.13:

a. Vertical measurement without confining ring.

b. Vertical measurement with confining ring.

c. Horizontal measurement without confining ring.

d. Horizontal measurement with confining ring.

Strain output tests were conducted with the HRSE gage in two orientations as shown in Figure 2.14:

a. Vertical measurement without confining ring.

b. Vertical measurement with confining ring.

Two LRSE gages were tested and each gage was calibrated three times in the four orientations (see PLATES 95-190). Only one HRSE gage was calibrated in this manner. The data for the three calibration tests in each configuration of the HRSE gage are documented on PLATES 191-214.

The results of 12 LRSE and 12 HRSE gage calibration tests in Yuma clayey sand are given on PLATES 215-238. All tests were conducted with voltage as the measured output. For both the LRSE and the HRSE series, six gages were calibrated one time each and one gage was calibrated six times.

Only 19 soil-embedded tests were conducted in Vicksburg loess (silty clay); all were conducted with voltage as the output variable. Nine of these tests were conducted using LRSE gages; six gages were tested one time each and one gage was tested three times (see PLATES 239-247). A total of 10 silty clay-embedded calibration tests were conducted using HRSE gages. Again, six gages were calibrated one time each, and one gage was calibrated four times (see PLATES 248-257).

Table 2.1
Oil-Immersed Calibration Tests

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
1	LRSE	6-3955-84	No	Hydraulic Oil/1	NA	Volts	0.25615	6.37123	2980.2	Full Bridge
2	LRSE	2-3692-84	No	Hydraulic Oil/1	NA	Volts	0.26055	6.52000	3170.3	Full Bridge
3	LRSE	2-3694-84	No	Hydraulic Oil/1	NA	Volts	0.25722	6.41587	3161.8	Full Bridge
4	LRSE	2-3703-84	No	Hydraulic Oil/1	NA	Volts	0.26892	7.00787	3497.3	Full Bridge
5	LRSE	2-3710-84	No	Hydraulic Oil/1	NA	Volts	0.25885	6.42937	3251.8	Full Bridge
6	LRSE	9-3603-83	No	Hydraulic Oil/1	NA	Volts	0.26927	6.92773	3528.0	Full Bridge
7	LRSE	9-3611-83	No	Hydraulic Oil/1	NA	Volts	0.27614	7.37281	3670.1	Full Bridge
8	LRSE	2-3710-84	No	Hydraulic Oil/1	NA	Volts	0.26717	6.28817	3470.3	Full Bridge
9	LRSE	2-3710-84	No	Hydraulic Oil/2	NA	Volts	0.26717	6.28817	3479.6	Full Bridge
10	LRSE	2-3710-84	No	Hydraulic Oil/3	NA	Volts	0.26717	6.28817	3400.5	Full Bridge
11	LRSE	2-3710-84	No	Hydraulic Oil/4	NA	Volts	0.26717	6.28817	3481.3	Full Bridge
12	LRSE	2-3710-84	No	Hydraulic Oil/5	NA	Volts	0.26717	6.28817	3456.8	Full Bridge
13	LRSE	2-3710-84	No	Hydraulic Oil/6	NA	Volts	0.26717	6.28817	3476.7	Full Bridge
14	HRSE	9-3968-84	No	Hydraulic Oil/1	NA	Volts	0.28987	10.44767	15629.5	Full Bridge
15	HRSE	8-3940-84	No	Hydraulic Oil/1	NA	Volts	0.26191	8.49026	14988.5	Full Bridge
16	HRSE	8-3941-84	No	Hydraulic Oil/1	NA	Volts	0.26332	8.63506	14287.2	Full Bridge
17	HRSE	8-3951-84	No	Hydraulic Oil/1	NA	Volts	0.28748	10.20199	16100.2	Full Bridge
18	HRSE	10-3633-83	No	Hydraulic Oil/1	NA	volts	0.24982	5.97530	13298.0	Full Bridge

(Sheet 1 of 4)

Table 2.1 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_s)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
19	HRSE	10-3627-83	No	Hydraulic Oil/1	NA	Volts	0.24875	5.92350	11981.0	Full Bridge
20	HRSE	10-3630-83	No	Hydraulic Oil/1	NA	Volts	0.25079	6.07781	13540.6	Full Bridge
21	HRSE	6-3515-83	No	Hydraulic Oil/1	NA	Volts	0.26420	6.75134	12790.5	Full Bridge
22	HRSE	6-3518-83	No	Hydraulic Oil/1	NA	Volts	0.26503	6.81003	12143.1	Full Bridge
23	HRSE	10-3620-83	No	Hydraulic Oil/1	NA	Volts	0.24814	5.90426	12242.8	Full Bridge
24	HRSE	10-3623-83	No	Hydraulic Oil/1	NA	Volts	0.25295	6.18042	11633.5	Full Bridge
25	HRSE	10-3625-83	No	Hydraulic Oil/1	NA	Volts	0.25170	6.03678	12566.7	Full Bridge
26	HRSE	8-3940-84	No	Hydraulic Oil/1	NA	Volts	0.28324	9.83134	15028.6	Full Bridge
27	HRSE	8-3940-84	No	Hydraulic Oil/2	NA	Volts	0.28324	9.83134	15120.6	Full Bridge
28	HRSE	8-3940-84	No	Hydraulic Oil/3	NA	Volts	0.28324	9.83134	15113.0	Full Bridge
29	HRSE	8-3940-84	No	Hydraulic Oil/4	NA	Volts	0.28324	9.83134	15065.3	Full Bridge
30	HRSE	8-3940-84	No	Hydraulic Oil/5	NA	Volts	0.28324	9.83134	15116.4	Full Bridge
31	HRSE	8-3940-84	No	Hydraulic Oil/6	NA	Volts	0.28324	9.83134	15123.5	Full Bridge
32	HRSE	10-4000-84	No	Hydraulic Oil/1	NA	Volts	0.29089	10.64859	14023.5	Full Bridge
33	HRSE	10-4000-84	No	Hydraulic Oil/2	NA	Volts	0.29089	10.64859	14039.5	Full Bridge
34	HRSE	10-4000-84	No	Hydraulic Oil/3	NA	Volts	0.29089	10.64859	14080.3	Full Bridge
35	HRSE	10-4000-84	No	Hydraulic Oil/4	NA	Volts	0.29089	10.64859	14109.1	Full Bridge
36	HRSE	10-4000-84	No	Hydraulic Oil/5	NA	Volts	0.29089	10.64859	14153.0	Full Bridge
37	HRSE	10-4000-84	No	Hydraulic Oil/6	NA	Volts	0.29089	10.64859	14148.9	Full Bridge

(Sheet 2 of 4)

Table 2.1 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
38	HRSE	10-4000-84	No	Hydraulic Oil/1	NA	Volts	0.23633	8.94404	13893.9	Full Bridge
39	LRSE	2-3694-84	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Edge
40	LRSE	2-3694-84	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Edge
41	LRSE	2-3694-84	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Center
42	LRSE	2-3694-84	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Center
43	LRSE	9-3601-83	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Edge
44	LRSE	9-3601-83	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Edge
45	LRSE	9-3601-83	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Center
46	LRSE	9-3601-83	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Center
47	HRSE	2	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Edge
48	HRSE	2	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Edge
49	HRSE	2	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Center
50	HRSE	2	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Center
51	HRSE	2	No	Hydraulic Oil/2	NA	Strain	—	—	—	Top Edge
52	HRSE	2	No	Hydraulic Oil/2	NA	Strain	—	—	—	Bottom Edge
53	HRSE	2	No	Hydraulic Oil/2	NA	Strain	—	—	—	Bottom Center
54	HRSE	2	No	Hydraulic Oil/2	NA	Strain	—	—	—	Top Center

(Sheet 3 of 4)

Table 2.1 (Concluded)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
55	HRSE	2	No	Hydraulic Oil/3	NA	Strain	—	—	—	Top Edge
56	HRSE	2	No	Hydraulic Oil/3	NA	Strain	—	—	—	Bottom Edge
57	HRSE	2	No	Hydraulic Oil/3	NA	Strain	—	—	—	Bottom Center
58	HRSE	2	No	Hydraulic Oil/3	NA	Strain	—	—	—	Top Center
59	HRSE	1	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Edge
60	HRSE	1	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Edge
61	HRSE	1	No	Hydraulic Oil/1	NA	Strain	—	—	—	Bottom Center
62	HRSE	1	No	Hydraulic Oil/1	NA	Strain	—	—	—	Top Center
63	HRSE	1	No	Hydraulic Oil/2	NA	Strain	—	—	—	Top Edge
64	HRSE	1	No	Hydraulic Oil/2	NA	Strain	—	—	—	Bottom Edge
65	HRSE	1	No	Hydraulic Oil/2	NA	Strain	—	—	—	Bottom Center
66	HRSE	1	No	Hydraulic Oil/2	NA	Strain	—	—	—	Top Center
67	HRSE	1	No	Hydraulic Oil/3	NA	Strain	—	—	—	Top Edge
68	HRSE	1	No	Hydraulic Oil/3	NA	Strain	—	—	—	Bottom Edge
69	HRSE	1	No	Hydraulic Oil/3	NA	Strain	—	—	—	Bottom Center
70	HRSE	1	No	Hydraulic Oil/3	NA	Strain	—	—	—	Top Center

(Sheet 4 of 4)

Table 2.2
Soil-Embedded Calibration Tests

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
71	LRSE	2-3703-84	No	Flume Sand/1	Vert	Volts	0.25781	6.92262	3466.0	Full Bridge
72	LRSE	2-3694-84	No	Flume Sand/1	Vert	Volts	0.24897	6.37263	2880.0	Full Bridge
73	LRSE	9-3611-83	No	Flume Sand/1	Vert	Volts	0.26559	7.28432	3551.1	Full Bridge
74	LRSE	2-3692-84	No	Flume Sand/1	Vert	Volts	0.25131	6.47099	2949.7	Full Bridge
75	LRSE	9-3603-83	No	Flume Sand/1	Vert	Volts	0.26764	6.43072	3099.3	Full Bridge
76	LRSE	2-3710-84	No	Flume Sand/1	Vert	Volts	0.24976	6.34108	3211.5	Full Bridge
77	LRSE	6-3955-84	No	Flume Sand/1	Vert	Volts	0.24787	6.39372	2892.7	Full Bridge
78	LRSE	6-3955-84	No	Flume Sand/2	Vert	Volts	0.23876	6.33956	2927.7	Full Bridge
79	LRSE	6-3955-84	No	Flume Sand/3	Vert	Volts	0.24631	6.39577	2978.3	Full Bridge
80	LRSE	6-3955-84	No	Flume Sand/4	Vert	Volts	0.24850	6.40265	3279.6	Full Bridge
81	LRSE	6-3955-84	No	Flume Sand/5	Vert	Volts	0.24848	6.40343	2974.1	Full Bridge
82	LRSE	6-3955-84	No	Flume Sand/6	Vert	Volts	0.24561	6.38175	3044.2	Full Bridge
83	HRSE	8-3951-84	No	Flume Sand/1	Vert	Volts	0.29322	6.49645	15636.8	Full Bridge
84	HRSE	9-3968-84	No	Flume Sand/1	Vert	Volts	0.29303	6.43369	14837.1	Full Bridge
85	HRSE	8-3941-84	No	Flume Sand/1	Vert	Volts	0.26860	6.35327	13209.6	Full Bridge
86	HRSE	10-3625-83	No	Flume Sand/1	Vert	Volts	0.24239	6.21974	11157.5	Full Bridge
87	HRSE	6-3515-83	No	Flume Sand/1	Vert	Volts	0.25498	6.32088	11777.6	Full Bridge

(Sheet 1 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
88	HRSE	10-3630-83	No	Flume Sand/1	Vert	Volts	0.23996	6.14889	12306.5	Full Bridge
89	HRSE	10-4000-84	No	Flume Sand/1	Vert	Volts	0.27192	6.37687	12914.1	Full Bridge
90	HRSE	10-4000-84	No	Flume Sand/2	Vert	Volts	0.27171	6.36729	12800.0	Full Bridge
91	HRSE	10-4000-84	No	Flume Sand/3	Vert	Volts	0.27130	6.35603	13198.3	Full Bridge
92	HRSE	10-4000-84	No	Flume Sand/4	Vert	Volts	0.27075	6.34230	13335.5	Full Bridge
93	HRSE	10-4000-84	No	Flume Sand/5	Vert	Volts	0.27176	6.35701	12961.6	Full Bridge
94	HRSE	10-4000-84	No	Flume Sand/6	Vert	Volts	0.27025	6.32981	12739.5	Full Bridge
95	LRSE	2-3694-84	Yes	Flume Sand/1	Vert	Strain	—	—	—	Bottom Center
96	LRSE	2-3694-84	Yes	Flume Sand/1	Vert	Strain	—	—	—	Top Center
97	LRSE	2-3694-84	Yes	Flume Sand/1	Vert	Strain	—	—	—	Bottom Edge
98	LRSE	2-3694-84	Yes	Flume Sand/1	Vert	Strain	—	—	—	Top Edge
99	LRSE	2-3694-84	Yes	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
100	LRSE	2-3694-84	Yes	Flume Sand/2	Vert	Strain	—	—	—	Top Center
101	LRSE	2-3694-84	Yes	Flume Sand/2	Vert	Strain	—	—	—	Bottom Edge
102	LRSE	2-3694-84	Yes	Flume Sand/2	Vert	Strain	—	—	—	Top Edge
103	LRSE	2-3694-84	Yes	Flume Sand/3	Vert	Strain	—	—	—	Bottom Center
104	LRSE	2-3694-84	Yes	Flume Sand/3	Vert	Strain	—	—	—	Top Center

(Sheet 2 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_s)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
105	LRSE	2-3694-84	Yes	Flume Sand/3	Vert	Strain	—	—	—	Bottom Edge
106	LRSE	2-3694-84	Yes	Flume Sand/3	Vert	Strain	—	—	—	Top Edge
107	LRSE	9-3601-83	Yes	Flume Sand/1	Vert	Strain	—	—	—	Bottom Center
108	LRSE	9-3601-83	Yes	Flume Sand/1	Vert	Strain	—	—	—	Top Center
109	LRSE	9-3601-83	Yes	Flume Sand/1	Vert	Strain	—	—	—	Bottom Edge
110	LRSE	9-3601-83	Yes	Flume Sand/1	Vert	Strain	—	—	—	Top Edge
111	LRSE	9-3601-83	Yes	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
112	LRSE	9-3601-83	Yes	Flume Sand/2	Vert	Strain	—	—	—	Top Center
113	LRSE	9-3601-83	Yes	Flume Sand/2	Vert	Strain	—	—	—	Bottom Edge
114	LRSE	9-3601-83	Yes	Flume Sand/2	Vert	Strain	—	—	—	Top Edge
115	LRSE	9-3601-83	Yes	Flume Sand/3	Vert	Strain	—	—	—	Bottom Center
116	LRSE	9-3601-83	Yes	Flume Sand/3	Vert	Strain	—	—	—	Top Center
117	LRSE	9-3601-83	Yes	Flume Sand/3	Vert	Strain	—	—	—	Bottom Edge
118	LRSE	9-3601-83	Yes	Flume Sand/3	Vert	Strain	—	—	—	Top Edge
119	LRSE	2-3694-84	No	Flume Sand/1	Vert	Strain	—	—	—	Bottom Center
120	LRSE	2-3694-84	No	Flume Sand/1	Vert	Strain	—	—	—	Top Center
121	LRSE	2-3694-84	No	Flume Sand/1	Vert	Strain	—	—	—	Bottom Edge
122	LRSE	2-3694-84	No	Flume Sand/1	Vert	Strain	—	—	—	Top Edge

(Sheet 3 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
123	LRSE	2-3694-84	No	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
124	LRSE	2-3694-84	No	Flume Sand/2	Vert	Strain	—	—	—	Top Center
125	LRSE	2-3694-84	No	Flume Sand/2	Vert	Strain	—	—	—	Bottom Edge
126	LRSE	2-3694-84	No	Flume Sand/2	Vert	Strain	—	—	—	Top Edge
127	LRSE	2-3694-84	No	Flume Sand/3	Vert	Strain	—	—	—	Bottom Center
128	LRSE	2-3694-84	No	Flume Sand/3	Vert	Strain	—	—	—	Top Center
129	LRSE	2-3694-84	No	Flume Sand/3	Vert	Strain	—	—	—	Bottom Edge
130	LRSE	2-3694-84	No	Flume Sand/3	Vert	Strain	—	—	—	Top Edge
131	LRSE	9-3601-83	No	Flume Sand/1	Vert	Strain	—	—	—	Bottom Center
132	LRSE	9-3601-83	No	Flume Sand/1	Vert	Strain	—	—	—	Top Center
133	LRSE	9-3601-83	No	Flume Sand/1	Vert	Strain	—	—	—	Bottom Edge
134	LRSE	9-3601-83	No	Flume Sand/1	Vert	Strain	—	—	—	Top Edge
135	LRSE	9-3601-83	No	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
136	LRSE	9-3601-83	No	Flume Sand/2	Vert	Strain	—	—	—	Top Center
137	LRSE	9-3601-83	No	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
138	LRSE	9-3601-83	No	Flume Sand/2	Vert	Strain	—	—	—	Top Edge
139	LRSE	9-3601-83	No	Flume Sand/3	Vert	Strain	—	—	—	Bottom Center
140	LRSE	9-3601-83	No	Flume Sand/3	Vert	Strain	—	—	—	Top Center

(Sheet 4 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
141	LRSE	9-3601-83	No	Flume Sand/3	Vert	Strain	—	—	—	Bottom Edge
142	LRSE	9-3601-83	No	Flume Sand/3	Vert	Strain	—	—	—	Top Edge
143	LRSE	2-3694-84	Yes	Flume Sand/1	Hor	Strain	—	—	—	Bottom Center
144	LRSE	2-3694-84	Yes	Flume Sand/1	Hor	Strain	—	—	—	Top Center
145	LRSE	2-3694-84	Yes	Flume Sand/1	Hor	Strain	—	—	—	Bottom Edge
146	LRSE	2-3694-84	Yes	Flume Sand/1	Hor	Strain	—	—	—	Top Edge
147	LRSE	2-3694-84	Yes	Flume Sand/2	Hor	Strain	—	—	—	Bottom Center
148	LRSE	2-3694-84	Yes	Flume Sand/2	Hor	Strain	—	—	—	Top Center
149	LRSE	2-3694-84	Yes	Flume Sand/2	Hor	Strain	—	—	—	Bottom Edge
150	LRSE	2-3694-84	Yes	Flume Sand/2	Hor	Strain	—	—	—	Top Edge
151	LRSE	2-3694-84	Yes	Flume Sand/3	Hor	Strain	—	—	—	Bottom Center
152	LRSE	2-3694-84	Yes	Flume Sand/3	Hor	Strain	—	—	—	Top Center
153	LRSE	2-3694-84	Yes	Flume Sand/3	Hor	Strain	—	—	—	Bottom Edge
154	LRSE	2-3694-84	Yes	Flume Sand/3	Hor	Strain	—	—	—	Top Edge
155	LRSE	9-3601-83	Yes	Flume Sand/1	Hor	Strain	—	—	—	Bottom Center
156	LRSE	9-3601-83	Yes	Flume Sand/1	Hor	Strain	—	—	—	Top Center
157	LRSE	9-3601-83	Yes	Flume Sand/1	Hor	Strain	—	—	—	Bottom Edge
158	LRSE	9-3601-83	Yes	Flume Sand/1	Hor	Strain	—	—	—	Top Edge

(Sheet 5 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
159	LRSE	9-3601-83	Yes	Flume Sand/2	Hor	Strain	—	—	—	Bottom Center
160	LRSE	9-3601-83	Yes	Flume Sand/2	Hor	Strain	—	—	—	Top Center
161	LRSE	9-3601-83	Yes	Flume Sand/2	Hor	Strain	—	—	—	Bottom Edge
162	LRSE	9-3601-83	Yes	Flume Sand/2	Hor	Strain	—	—	—	Top Edge
163	LRSE	9-3601-83	Yes	Flume Sand/3	Hor	Strain	—	—	—	Bottom Center
164	LRSE	9-3601-83	Yes	Flume Sand/3	Hor	Strain	—	—	—	Top Center
165	LRSE	9-3601-83	Yes	Flume Sand/3	Hor	Strain	—	—	—	Bottom Edge
166	LRSE	9-3601-83	Yes	Flume Sand/3	Hor	Strain	—	—	—	Top Edge
167	LRSE	2-3694-84	No	Flume Sand/1	Hor	Strain	—	—	—	Bottom Center
168	LRSE	2-3694-84	No	Flume Sand/1	Hor	Strain	—	—	—	Top Center
169	LRSE	2-3694-84	No	Flume Sand/1	Hor	Strain	—	—	—	Bottom Edge
170	LRSE	2-3694-84	No	Flume Sand/1	Hor	Strain	—	—	—	Top Edge
171	LRSE	2-3694-84	No	Flume Sand/2	Hor	Strain	—	—	—	Bottom Center
172	LRSE	2-3694-84	No	Flume Sand/2	Hor	Strain	—	—	—	Top Center
173	LRSE	2-3694-84	No	Flume Sand/2	Hor	Strain	—	—	—	Bottom Edge
174	LRSE	2-3694-84	No	Flume Sand/2	Hor	Strain	—	—	—	Top Edge
175	LRSE	2-3694-84	No	Flume Sand/3	Hor	Strain	—	—	—	Bottom Center
176	LRSE	2-3694-84	No	Flume Sand/3	Hor	Strain	—	—	—	Top Center

(Sheet 6 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
177	LRSE	2-3694-84	No	Flume Sand/3	Hor	Strain	—	—	—	Bottom Edge
178	LRSE	2-3694-84	No	Flume Sand/3	Hor	Strain	—	—	—	Top Edge
179	LRSE	9-3601-83	No	Flume Sand/1	Hor	Strain	—	—	—	Bottom Center
180	LRSE	9-3601-83	No	Flume Sand/1	Hor	Strain	—	—	—	Top Center
181	LRSE	9-3601-83	No	Flume Sand/1	Hor	Strain	—	—	—	Bottom Edge
182	LRSE	9-3601-83	No	Flume Sand/1	Hor	Strain	—	—	—	Top Edge
183	LRSE	9-3601-83	No	Flume Sand/2	Hor	Strain	—	—	—	Bottom Center
184	LRSE	9-3601-83	No	Flume Sand/2	Hor	Strain	—	—	—	Top Center
185	LRSE	9-3601-83	No	Flume Sand/2	Hor	Strain	—	—	—	Bottom Edge
186	LRSE	9-3601-83	No	Flume Sand/2	Hor	Strain	—	—	—	Top Edge
187	LRSE	9-3601-83	No	Flume Sand/3	Hor	Strain	—	—	—	Bottom Center
188	LRSE	9-3601-83	No	Flume Sand/3	Hor	Strain	—	—	—	Top Center
189	LRSE	9-3601-83	No	Flume Sand/3	Hor	Strain	—	—	—	Bottom Edge
190	LRSE	9-3601-83	No	Flume Sand/3	Hor	Strain	—	—	—	Top Edge
191	HRSE	2	Yes	Flume Sand/1	Vert	Strain	—	—	—	Bottom Center
192	HRSE	2	Yes	Flume Sand/1	Vert	Strain	—	—	—	Top Center
193	HRSE	2	Yes	Flume Sand/1	Vert	Strain	—	—	—	Bottom Edge

(Sheet 7 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
194	HRSE	2	Yes	Flume Sand/1	Vert	Strain	—	—	—	Top Edge
195	HRSE	2	Yes	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
196	HRSE	2	Yes	Flume Sand/2	Vert	Strain	—	—	—	Top Center
197	HRSE	2	Yes	Flume Sand/2	Vert	Strain	—	—	—	Bottom Edge
198	HRSE	2	Yes	Flume Sand/2	Vert	Strain	—	—	—	Top Edge
199	HRSE	2	Yes	Flume Sand/3	Vert	Strain	—	—	—	Bottom Center
200	HRSE	2	Yes	Flume Sand/3	Vert	Strain	—	—	—	Top Center
201	HRSE	2	Yes	Flume Sand/3	Vert	Strain	—	—	—	Bottom Edge
202	HRSE	2	Yes	Flume Sand/3	Vert	Strain	—	—	—	Top Edge
203	HRSE	2	No	Flume Sand/1	Vert	Strain	—	—	—	Bottom Center
204	HRSE	2	No	Flume Sand/1	Vert	Strain	—	—	—	Top Center
205	HRSE	2	No	Flume Sand/1	Vert	Strain	—	—	—	Bottom Edge
206	HRSE	2	No	Flume Sand/1	Vert	Strain	—	—	—	Top Edge
207	HRSE	2	No	Flume Sand/2	Vert	Strain	—	—	—	Bottom Center
208	HRSE	2	No	Flume Sand/2	Vert	Strain	—	—	—	Top Center
209	HRSE	2	No	Flume Sand/2	Vert	Strain	—	—	—	Bottom Edge
210	HRSE	2	No	Flume Sand/2	Vert	Strain	—	—	—	Top Edge
211	HRSE	2	No	Flume Sand/3	Vert	Strain	—	—	—	Bottom Center

(Sheet 8 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_s)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
212	HRSE	2	No	Flume Sand/3	Vert	Strain	—	—	—	Top Center
213	HRSE	2	No	Flume Sand/3	Vert	Strain	—	—	—	Bottom Edge
214	HRSE	2	No	Flume Sand/3	Vert	Strain	—	—	—	Top Edge
215	LRSE	2-3703-84	No	Clayey Sand/1	Vert	Volts	0.25751	6.92273	3446.4	Full Bridge
216	LRSE	2-3694-84	No	Clayey Sand/1	Vert	Volts	0.25004	6.37634	3173.5	Full Bridge
217	LRSE	9-3611-83	No	Clayey Sand/1	Vert	Volts	0.34320	7.65065	3106.2	Full Bridge
218	LRSE	2-3692-84	No	Clayey Sand/1	Vert	Volts	0.24957	6.46274	2715.9	Full Bridge
219	LRSE	9-3603-83	No	Clayey Sand/1	Vert	Volts	0.26692	7.40024	3057.2	Full Bridge
220	LRSE	2-3710-84	No	Clayey Sand/1	Vert	Volts	0.24710	6.36509	3113.7	Full Bridge
221	LRSE	6-3955-84	No	Clayey Sand/1	Vert	Volts	024725	6.41239	2766.4	Full Bridge
222	LRSE	6-3955-84	No	Clayey Sand/2	Vert	Volts	0.24660	6.38392	3009.1	Full Bridge
223	LRSE	6-3955-84	No	Clayey Sand/3	Vert	Volts	0.24735	6.41001	2771.1	Full Bridge
224	LRSE	6-3955-84	No	Clayey Sand/4	Vert	Volts	0.24570	6.40062	3109.3	Full Bridge
225	LRSE	6-3955-84	No	Clayey Sand/5	Vert	Volts	0.24436	6.39231	2848.0	Full Bridge
226	LRSE	6-3955-84	No	Clayey Sand/6	Vert	Volts	0.24757	6.28152	3048.1	Full Bridge
227	HRSE	8-3941-84	No	Clayey Sand/1	Vert	Volts	0.27050	6.43472	13923.2	Full Bridge

(Sheet 9 of 11)

Table 2.2 (Continued)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
228	HRSE	9-3968-84	No	Clayey Sand/1	Vert	Volts	0.29240	6.42579	13890.9	Full Bridge
229	HRSE	8-3951-84	No	Clayey Sand/1	Vert	Volts	0.29289	6.50550	12771.0	Full Bridge
230	HRSE	10-3625-83	No	Clayey Sand/1	Vert	Volts	0.24206	6.16446	11655.6	Full Bridge
231	HRSE	6-3515-83	No	Clayey Sand/1	Vert	Volts	0.25481	6.30138	9772.9	Full Bridge
232	HRSE	10-3630-83	No	Clayey Sand/1	Vert	Volts	0.23906	6.17753	9508.5	Full Bridge
233	HRSE	8-3940-84	No	Clayey Sand/1	Vert	Volts	0.26703	6.30191	14786.3	Full Bridge
234	HRSE	8-3940-84	No	Clayey Sand/2	Vert	Volts	0.26656	6.29288	18619.6	Full Bridge
235	HRSE	8-3940-84	No	Clayey Sand/3	Vert	Volts	0.26631	6.28848	10533.3	Full Bridge
236	HRSE	8-3940-84	No	Clayey Sand/4	Vert	Volts	0.26331	6.28057	9370.6	Full Bridge
237	HRSE	8-3940-84	No	Clayey Sand/5	Vert	Volts	0.26706	6.30902	10603.0	Full Bridge
238	HRSE	8-3940-84	No	Clayey Sand/6	Vert	Volts	0.26679	6.28786	10298.9	Full Bridge
239	LRSE	2-3703-84	No	Silty Clay/1	Vert	Volts	0.25447	6.91398	3150.1	Full Bridge
240	LRSE	2-3694-84	No	Silty Clay/1	Vert	Volts	0.24535	6.39791	2838.9	Full Bridge
241	LRSE	9-3611-83	No	Silty Clay/1	Vert	Volts	0.26203	7.28552	3170.3	Full Bridge
242	LRSE	2-3692-84	No	Silty Clay/1	Vert	Volts	0.24474	6.44172	2810.5	Full Bridge
243	LRSE	9-3603-83	No	Silty Clay/1	Vert	Volts	0.26321	6.41176	2881.9	Full Bridge
244	LRSE	2-3710-84	No	Silty Clay/1	Vert	Volts	0.24334	6.34741	2879.4	Full Bridge

(Sheet 10 of 11)

Table 2.2 (Concluded)

Plate Number	Gage Type	Serial Number	Confining Ring (Yes/No)	Calibration Medium/Run Number	Gage Orientation (Vert/Hor)	Output Measurement (Volts/Strain)	Gage Resistance (R_g)	Amplifier Gain Factor (K)	Calibration Constant (Ca)	Strain Gage Recorded
245	LRSE	6-3955-84	No	Silty Clay/1	Vert	Volts	0.24487	6.39000	2742.2	Full Bridge
246	LRSE	6-3955-84	No	Silty Clay/2	Vert	Volts	0.24498	6.38901	2592.8	Full Bridge
247	LRSE	6-3955-84	No	Silty Clay/3	Vert	Volts	0.24373	6.35841	2619.4	Full Bridge
248	HRSE	10-3623-83	No	Silty Clay/1	Vert	Volts	0.24034	6.19342	9935.4	Full Bridge
249	HRSE	10-3627-83	No	Silty Clay/1	Vert	Volts	0.23484	5.90089	9969.7	Full Bridge
250	HRSE	10-3625-83	No	Silty Clay/1	Vert	Volts	0.23841	6.05661	9996.6	Full Bridge
251	HRSE	10-3620-83	No	Silty Clay/1	Vert	Volts	0.23643	5.95133	8927.3	Full Bridge
252	HRSE	10-3630-83	No	Silty Clay/1	Vert	Volts	0.24103	6.08278	11584.9	Full Bridge
253	HRSE	6-3518-83	No	Silty Clay/1	Vert	Volts	0.24968	6.69804	12028.8	Full Bridge
254	HRSE	6-3515-83	No	Silty Clay/1	Vert	Volts	0.25091	6.68272	11348.3	Full Bridge
255	HRSE	10-3623-83	No	Silty Clay/1	Vert	Volts	0.23604	6.12567	9912.9	Full Bridge
256	HRSE	10-3623-83	No	Silty Clay/2	Vert	Volts	0.23746	6.18808	9542.6	Full Bridge
257	HRSE	10-3623-83	No	Silty Clay/3	Vert	Volts	0.24082	6.17389	9223.1	Full Bridge

(Sheet 11 of 11)

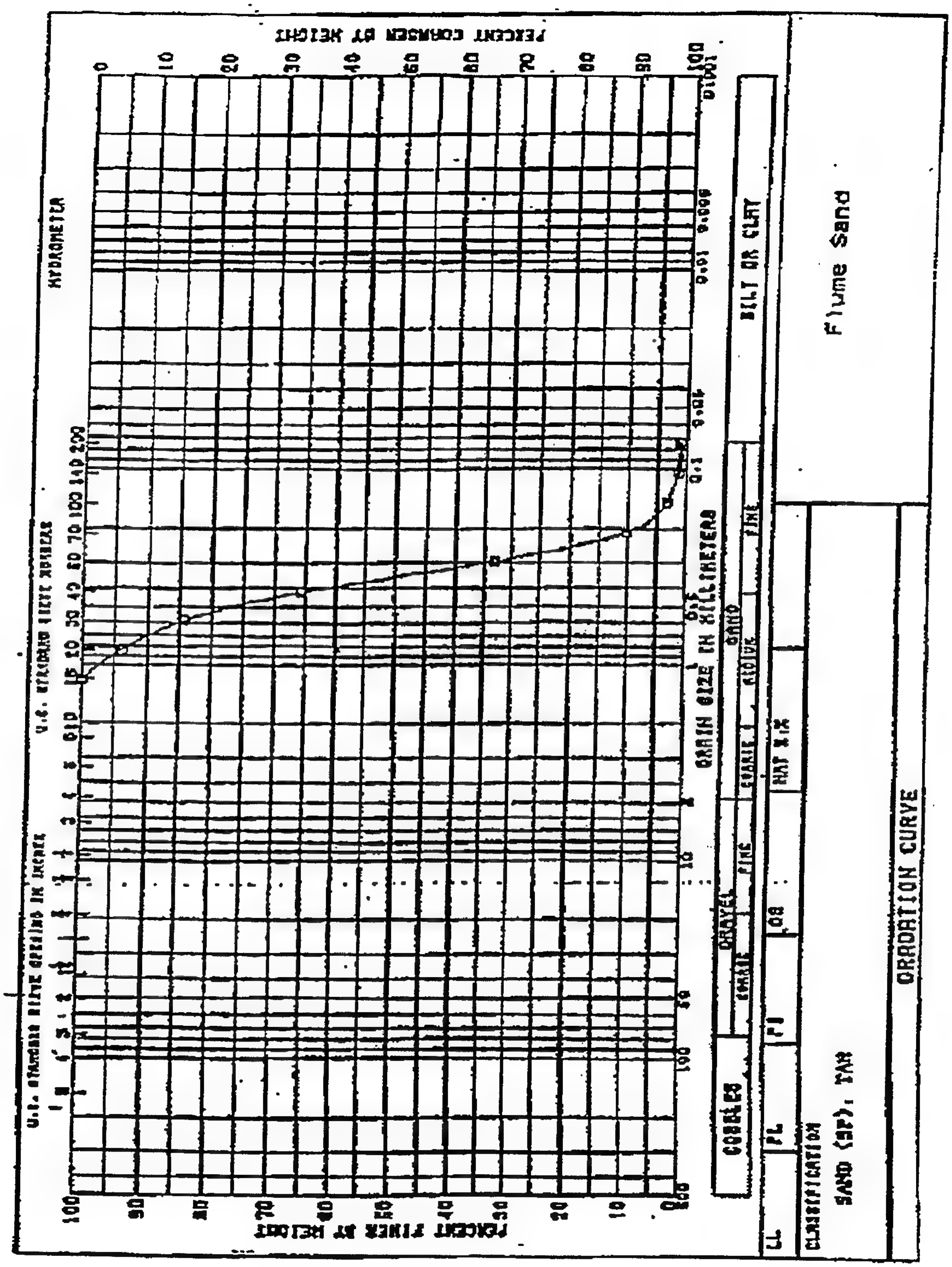


Figure 2.1. Typical grain-size distribution for flume sand

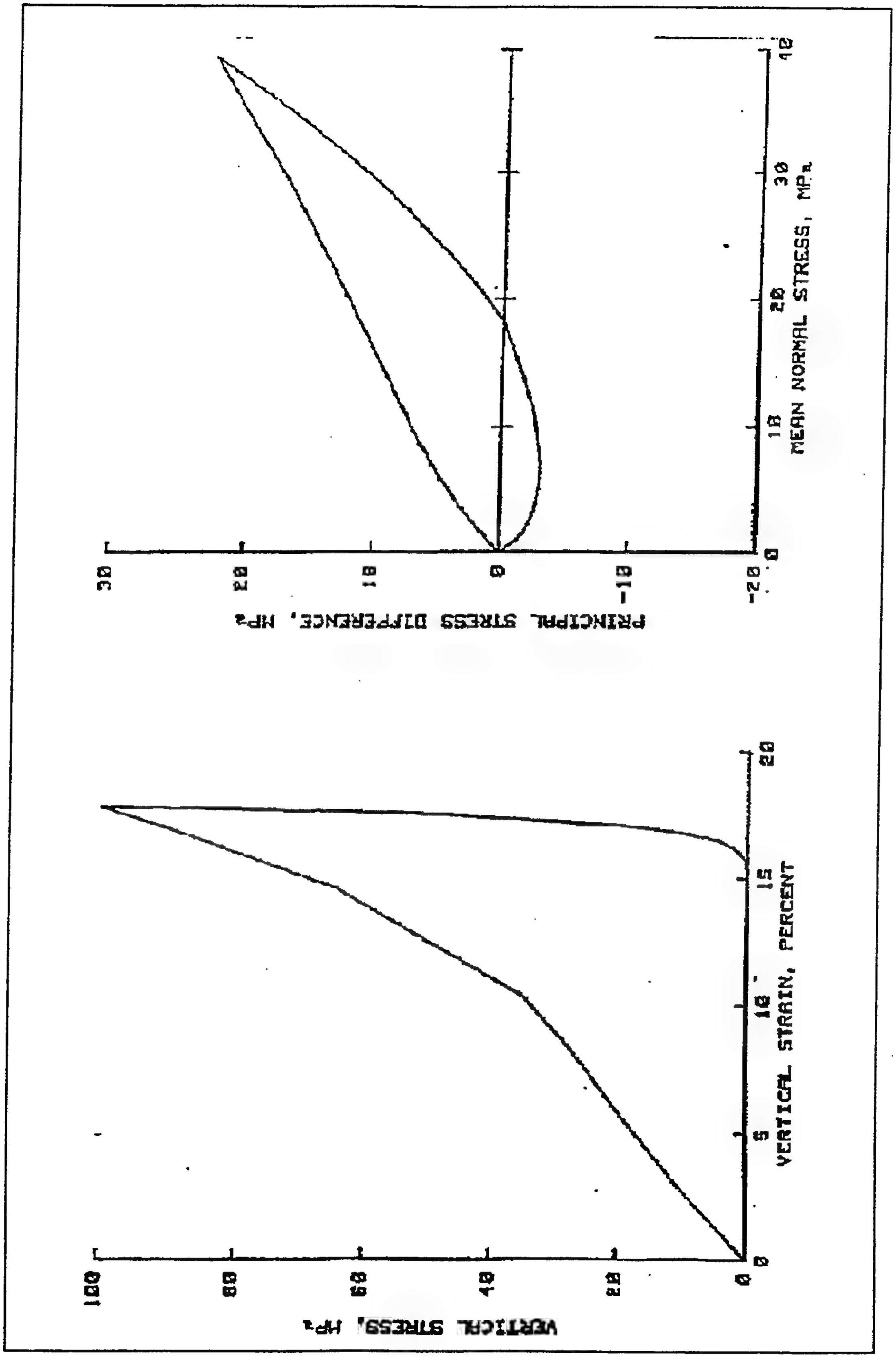


Figure 2.2. UX stress-strain relation and UX stress path for flume sand with γ_d = 1.62 Mg/m^3 and w = 5.0 percent

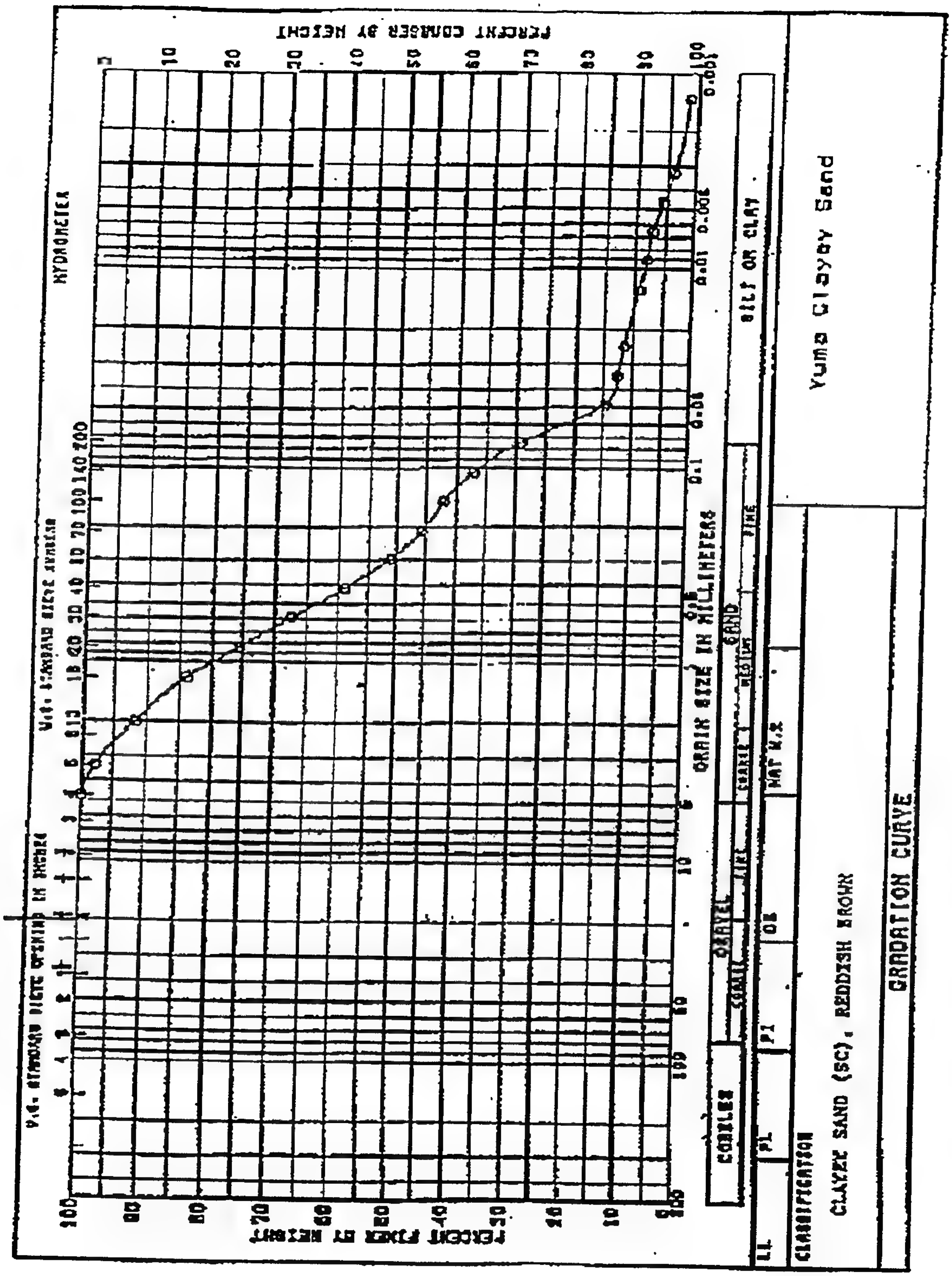


Figure 2.3. Typical grain-size distribution for Yuma clayey sand

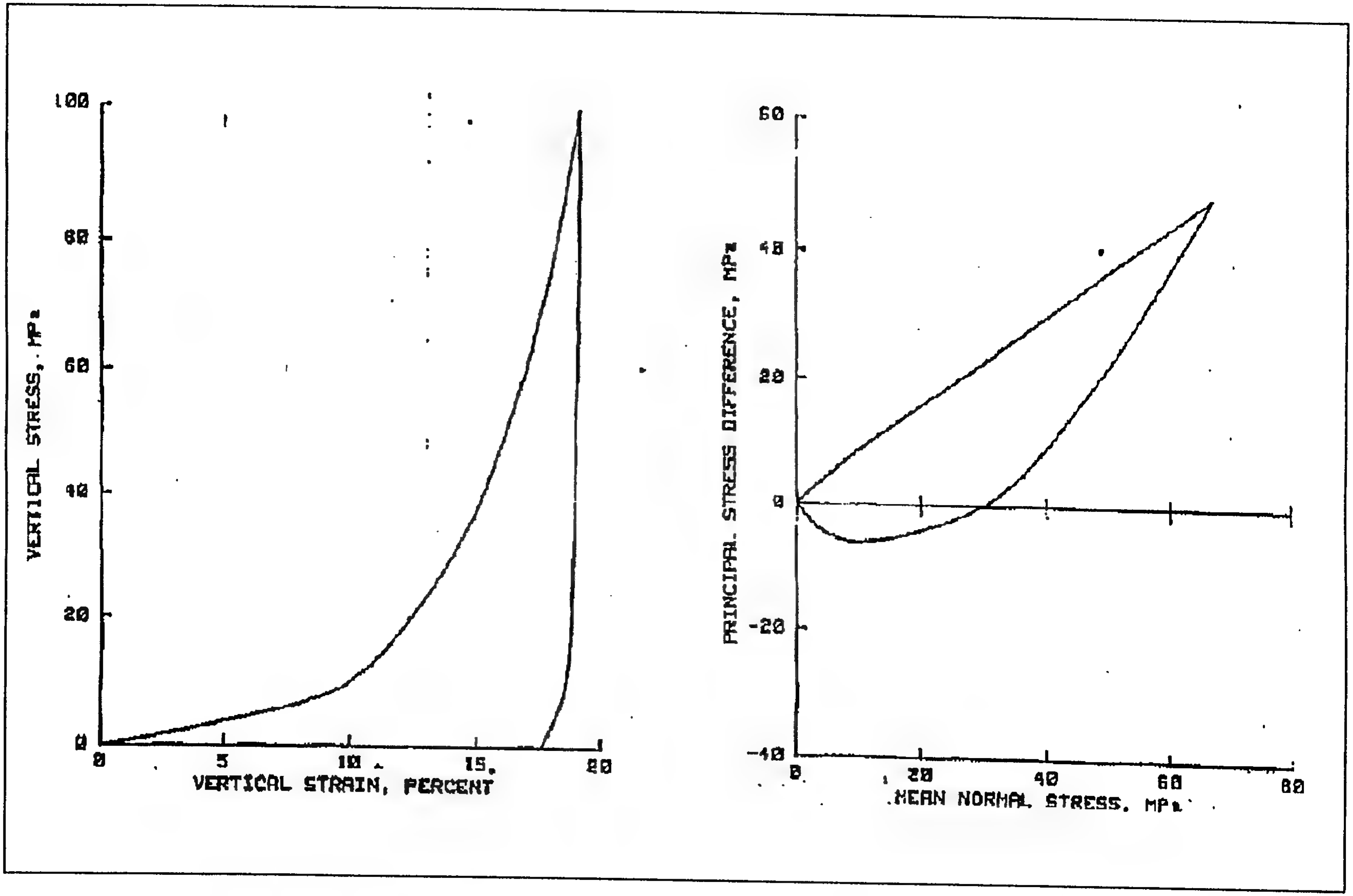


Figure 2.4. UX stress-strain relation and UX stress path for Yuma clayey sand with γ_d = 1.84 Mg/m^3 and w = 3.0 percent

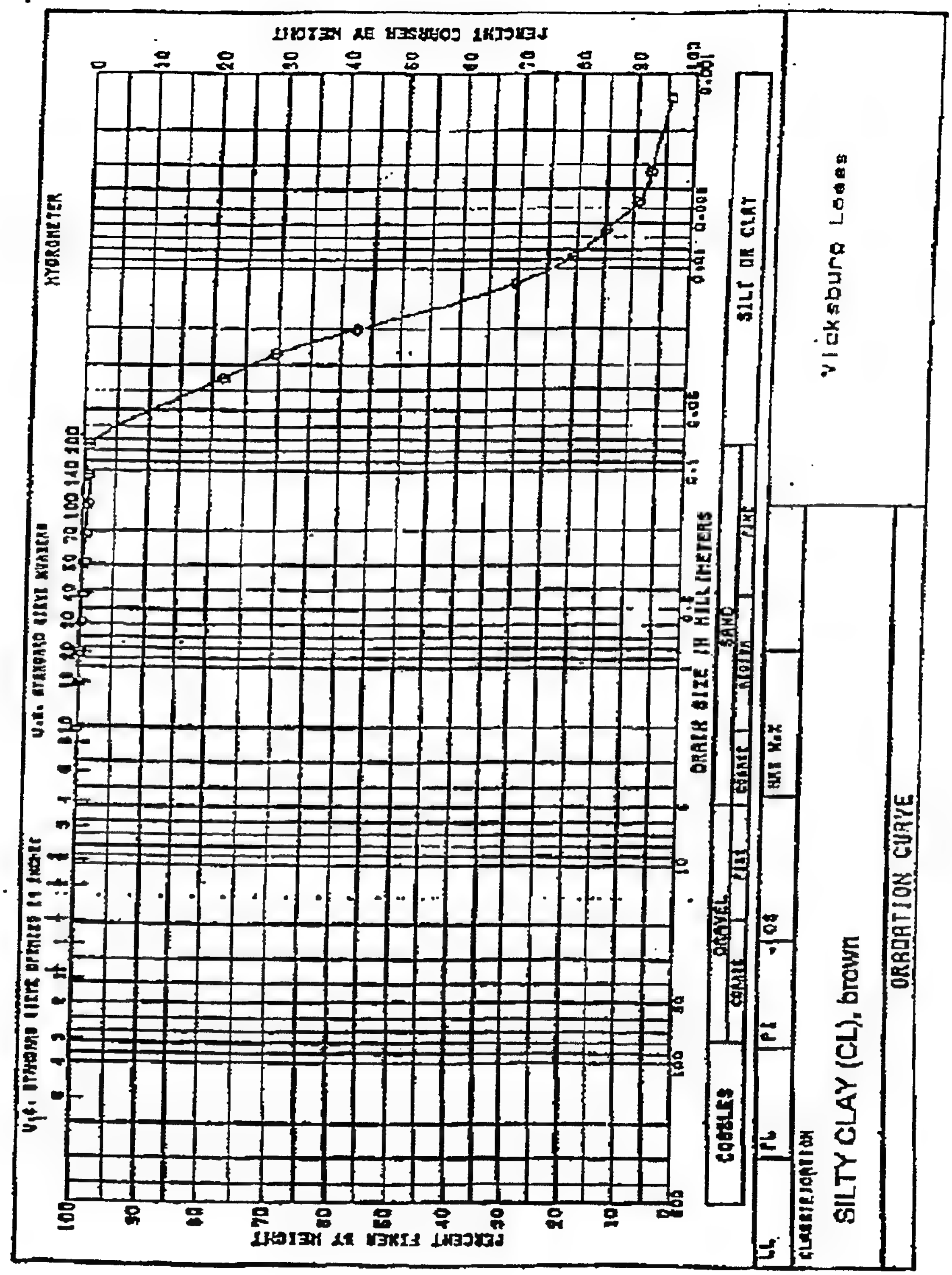


Figure 2.5. Typical grain-size distribution for Vicksburg loess

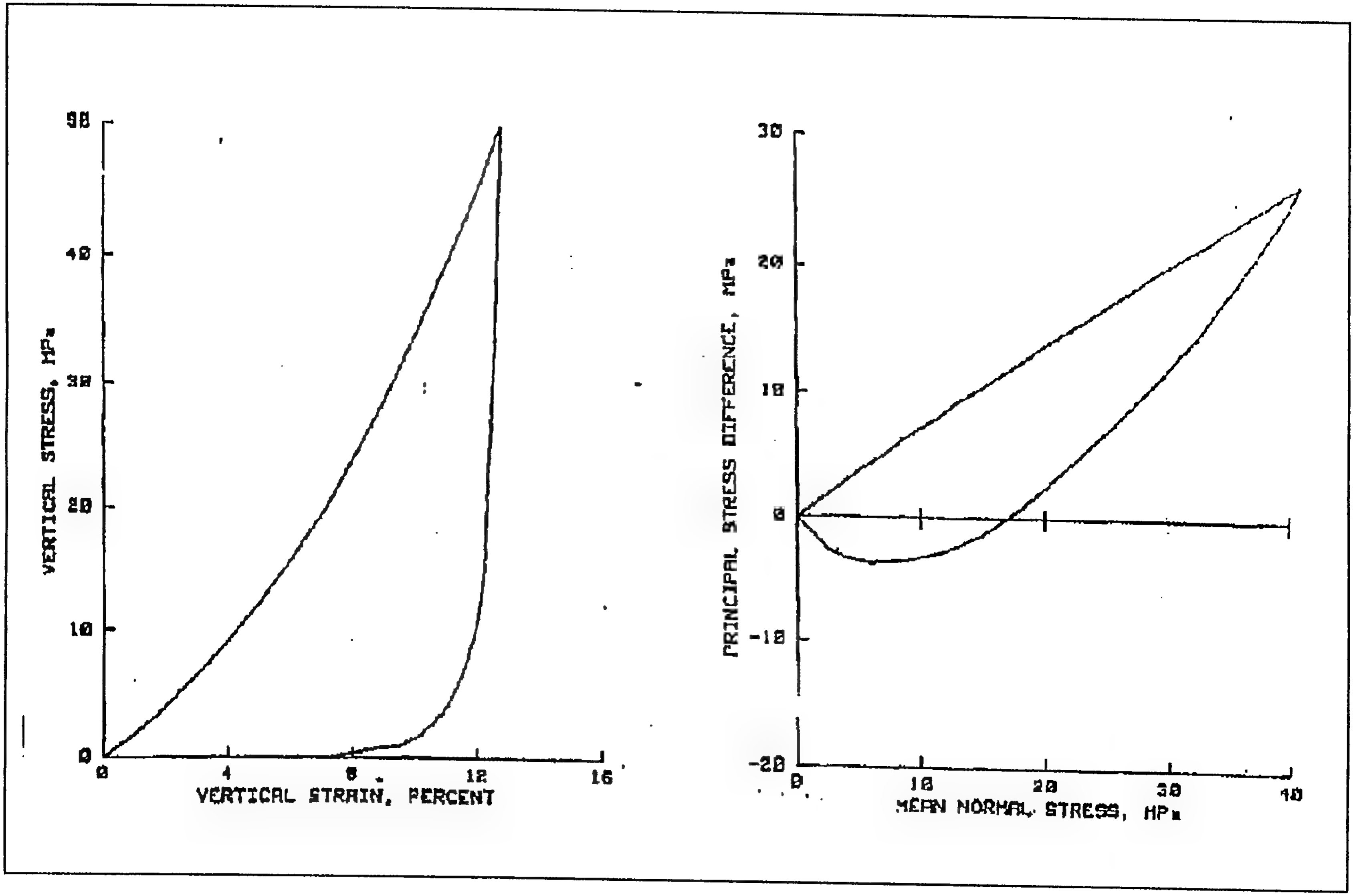


Figure 2.6. UX stress-strain relation and UX stress path for Vicksburg loess with γ_d = 1.62 Mg/m^3 and w = 11.9 percent

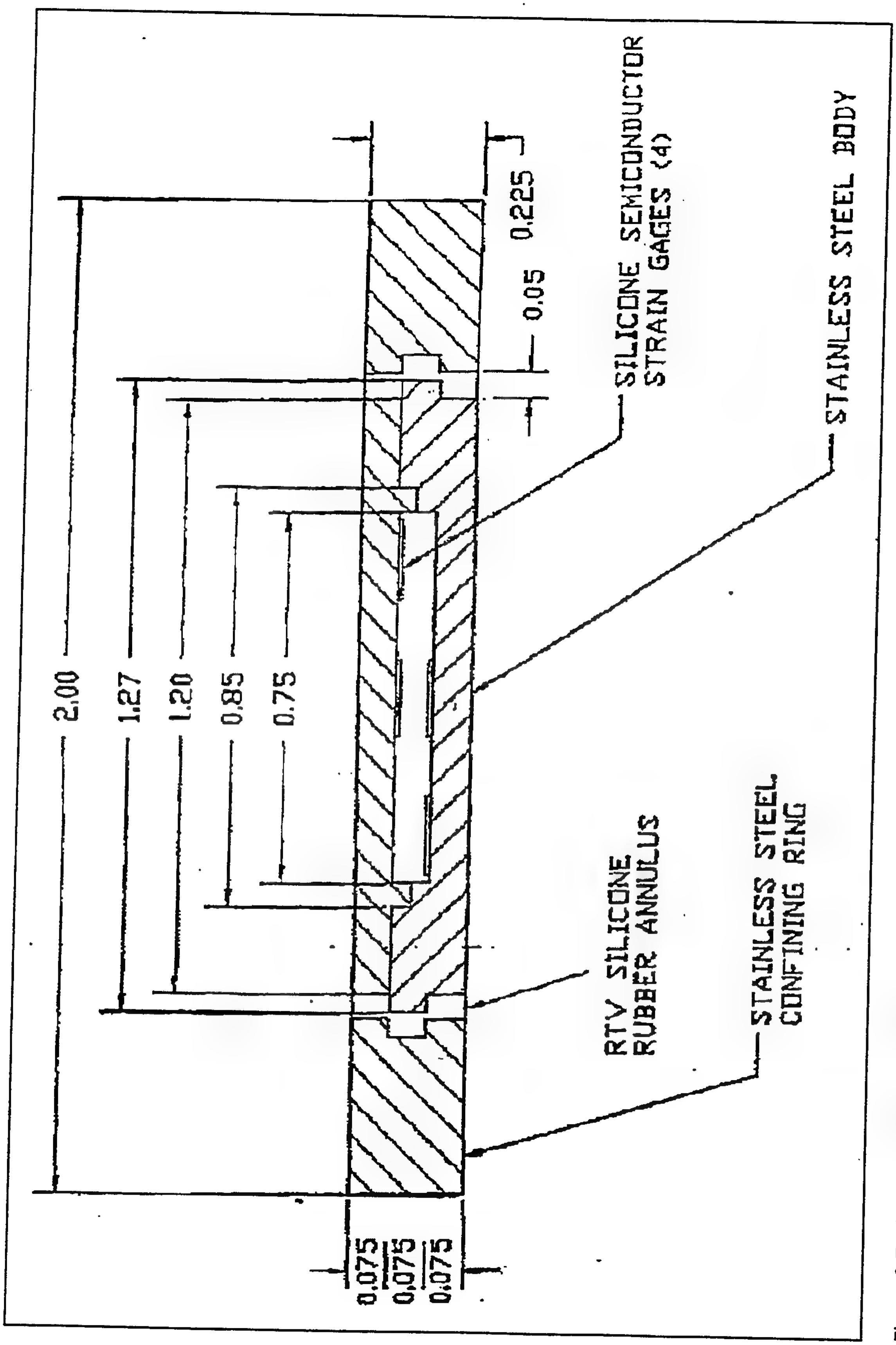


Figure 2.7. Cross-section of LRSE gage

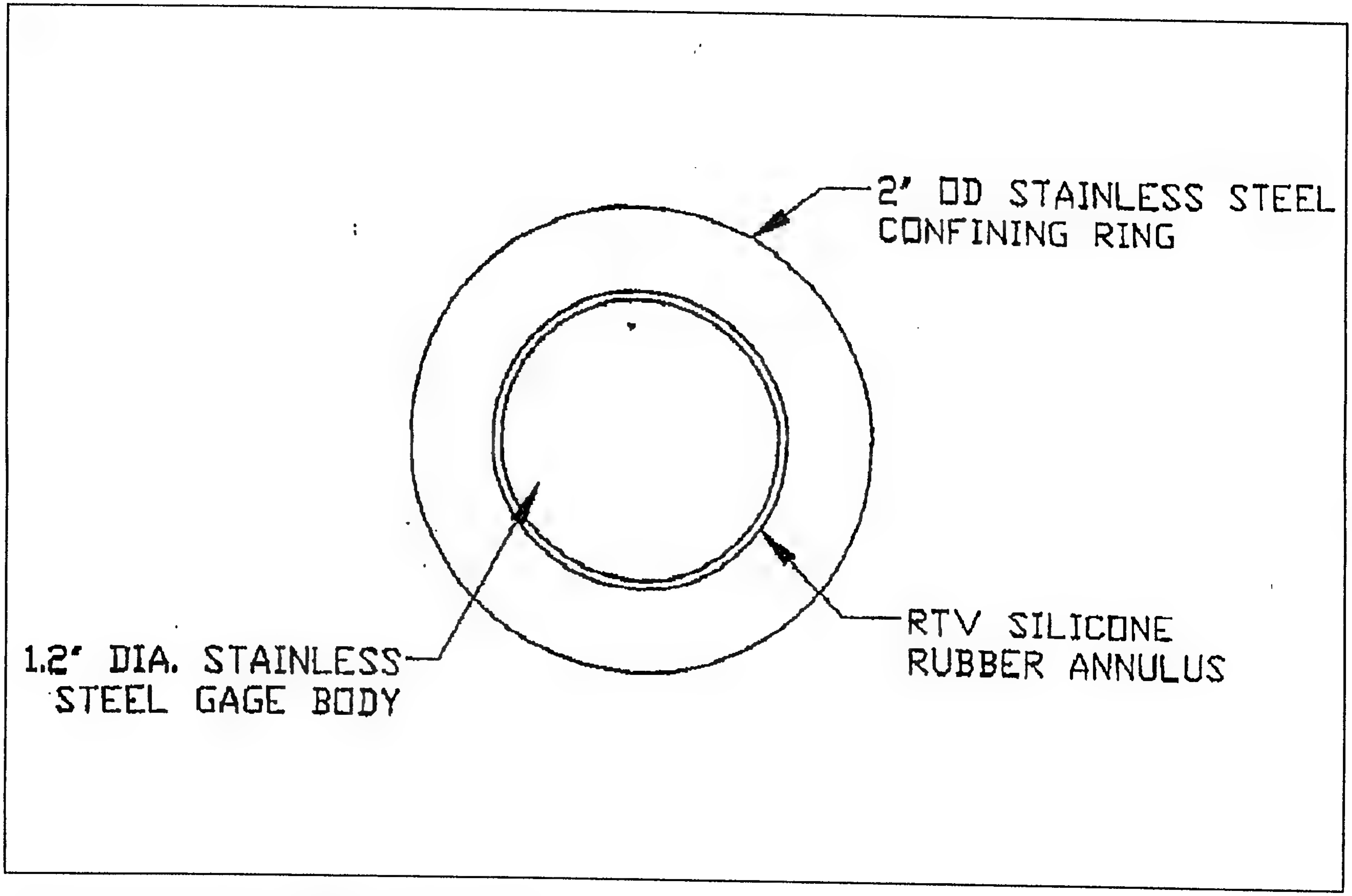


Figure 2.8. Plan view of LRSE gage with confining ring

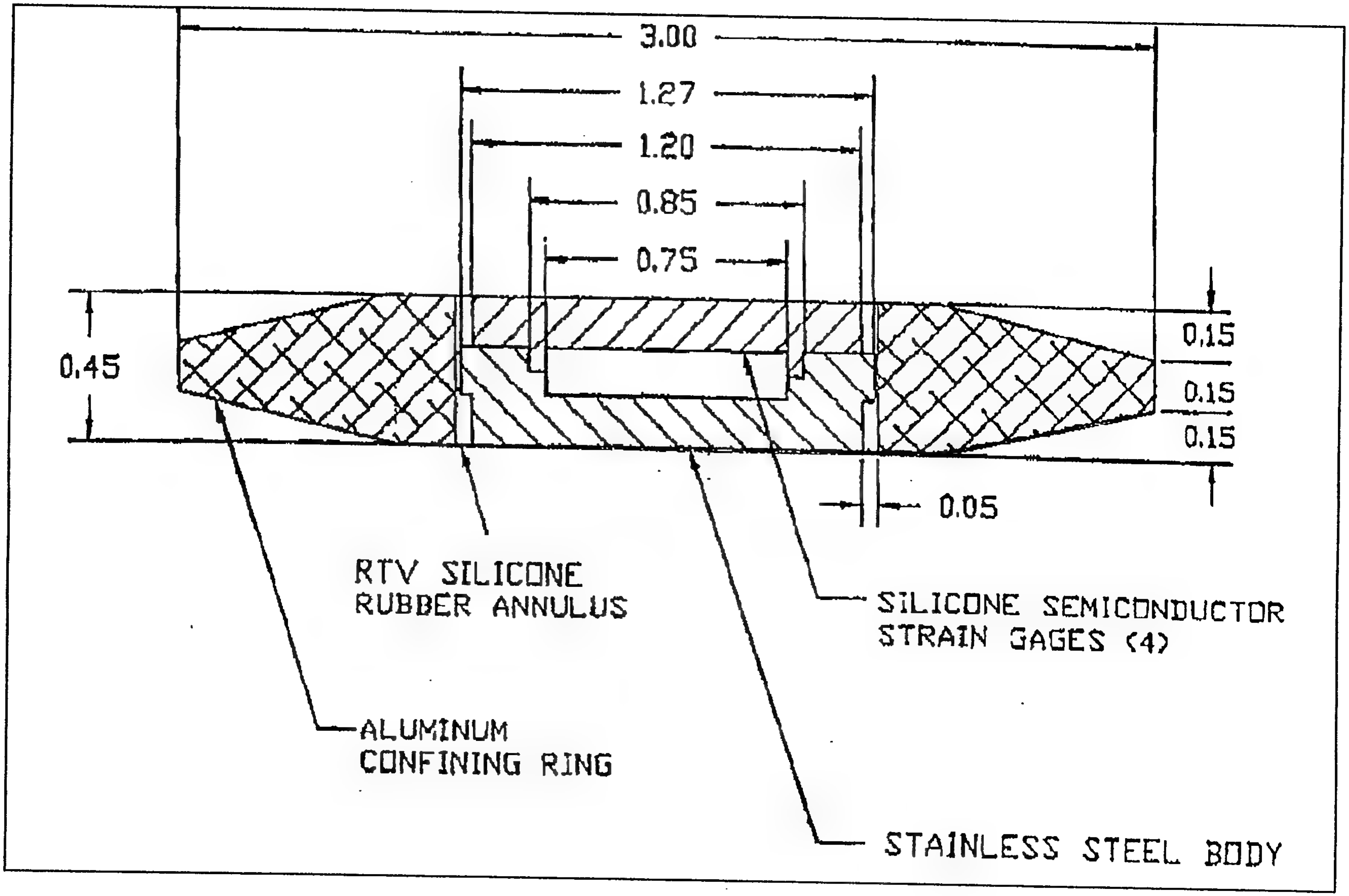


Figure 2.9. Cross-section of HRSE gage

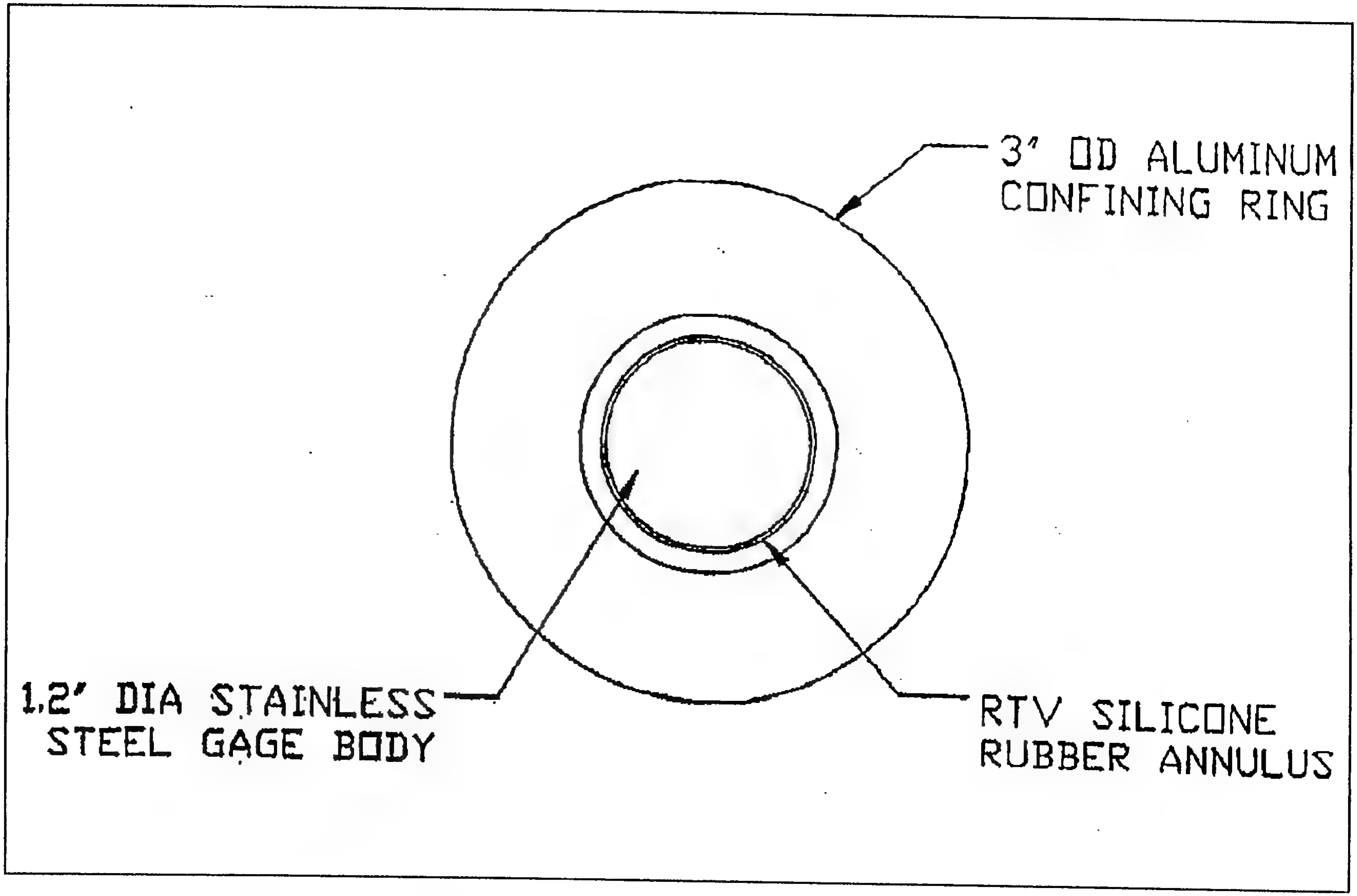


Figure 2.10. Plan view of HRSE gage with confining ring

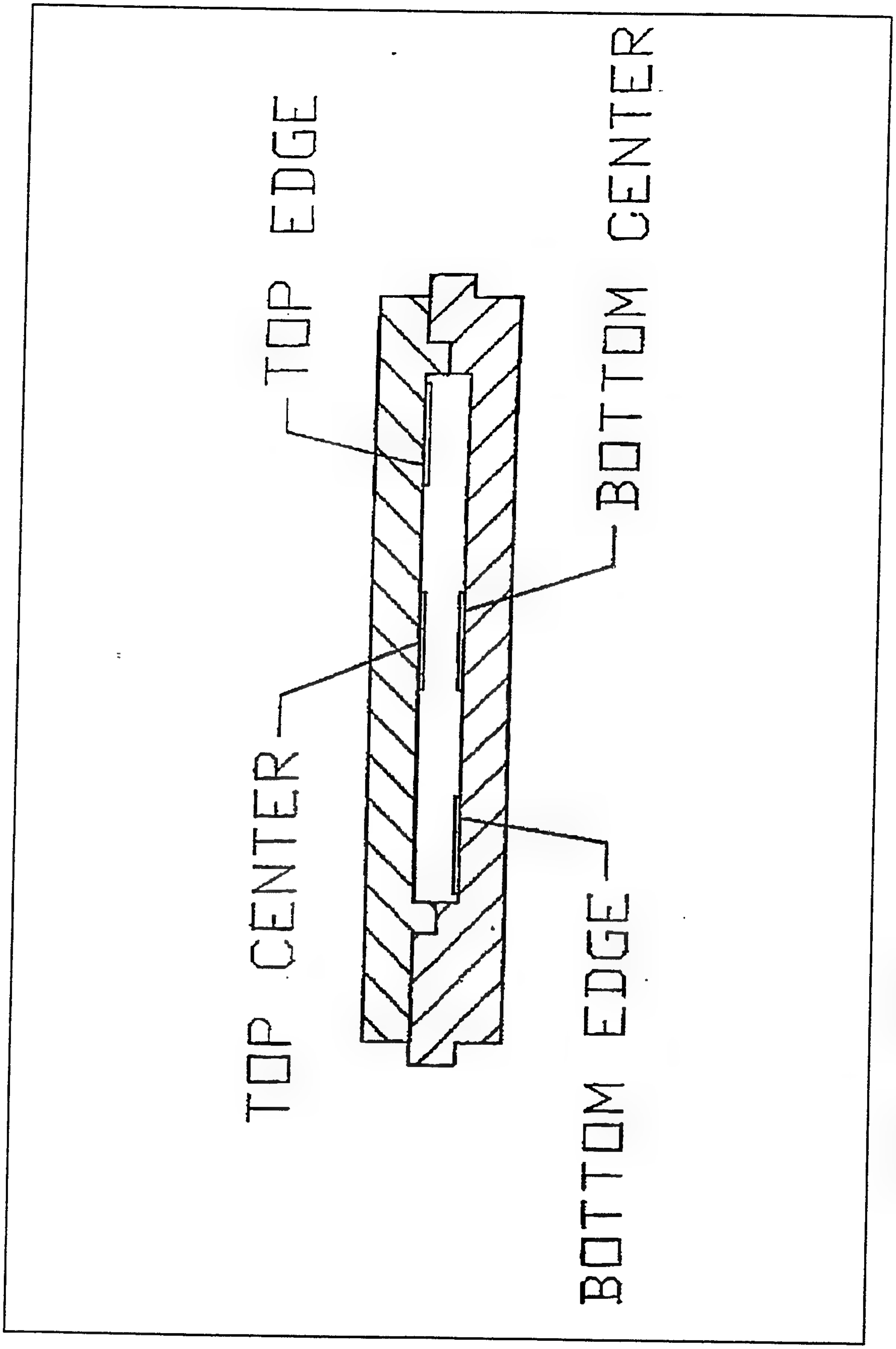


Figure 2.11. Nomenclature for individual strain gages in LRSE and HRSE soil stress gages

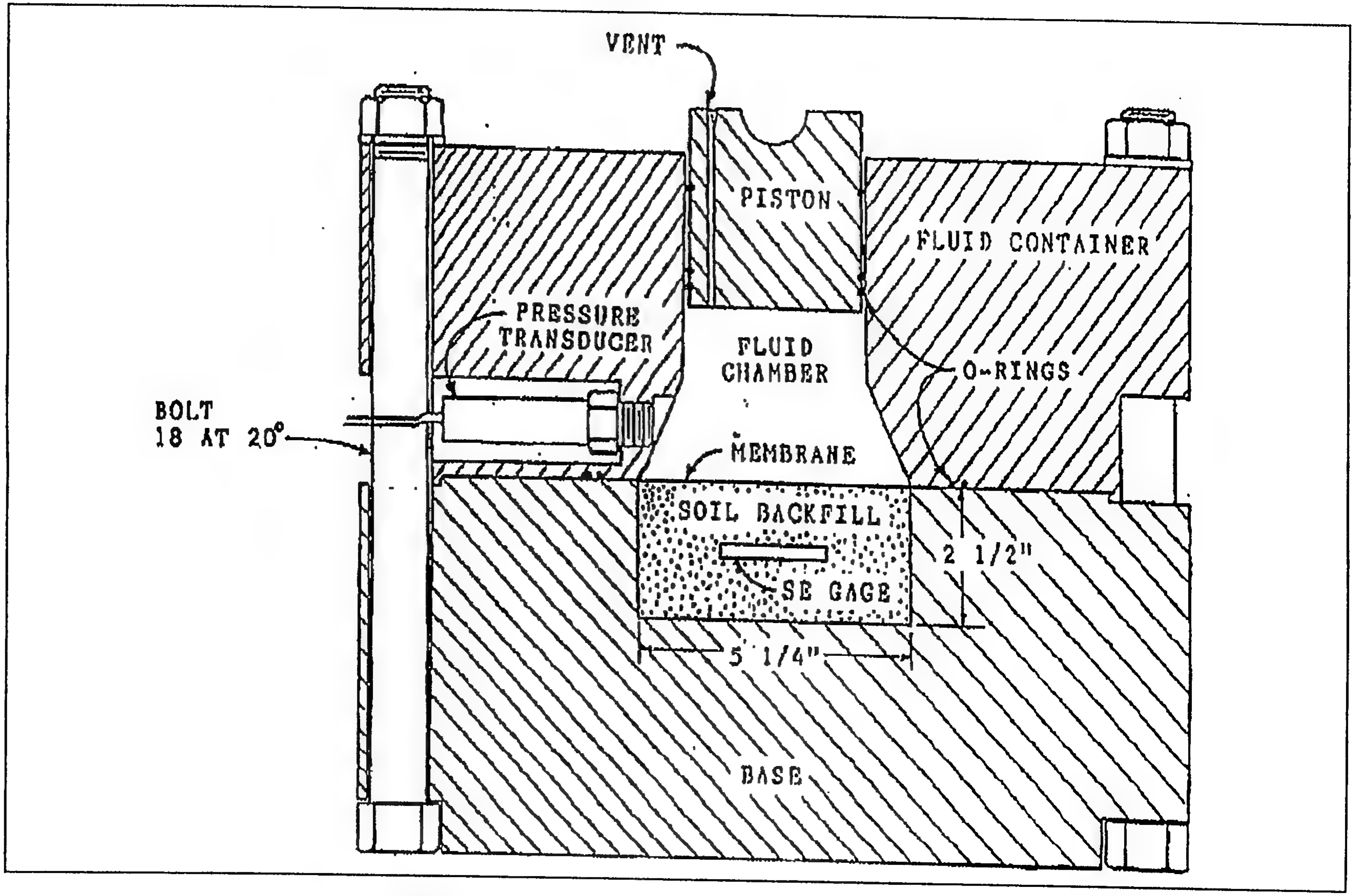


Figure 2.12. Test device used for soil-embedded gage calibrations

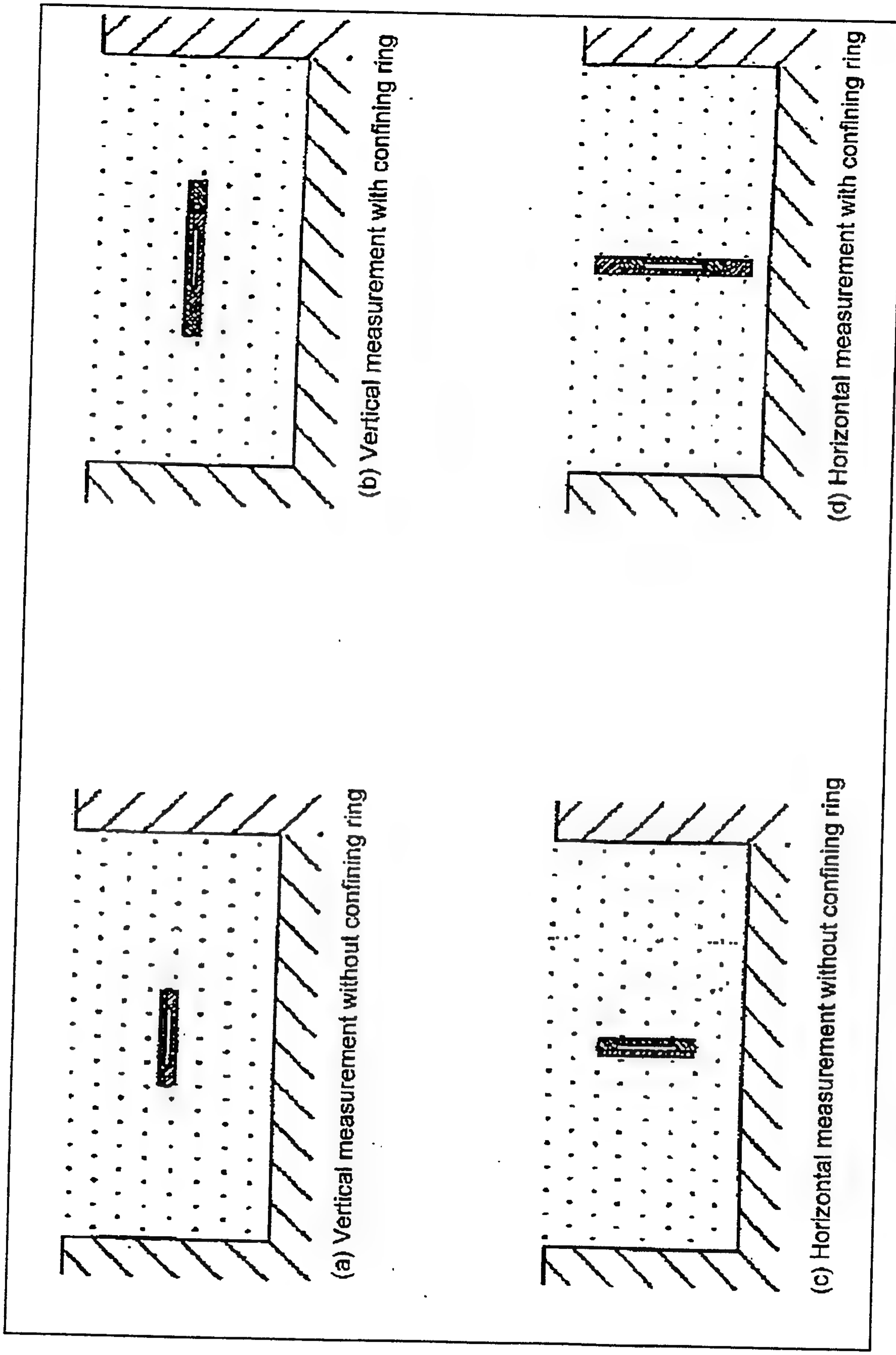
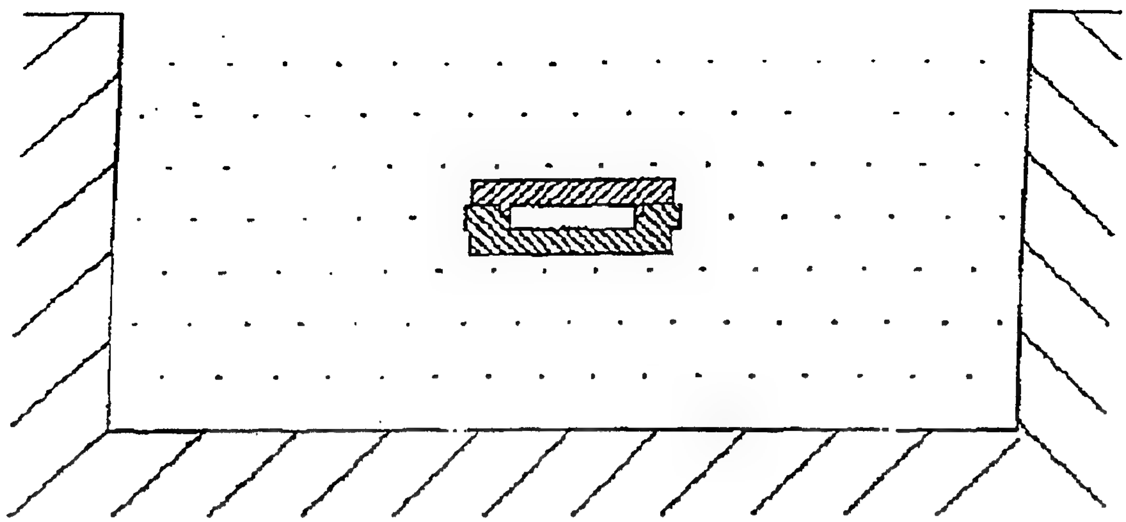
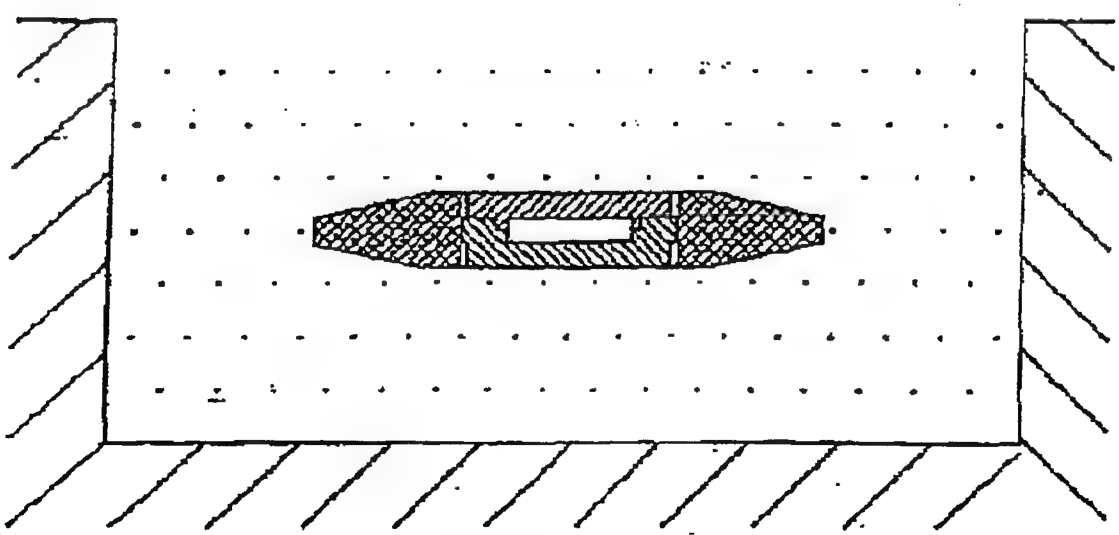


Figure 2.13. Four orientations for soil-embedded calibrations of LRSE gages



(a) Vertical measurement without confining ring



(b) Vertical measurement with confining ring

Figure 2.14. Two orientations for soil-embedded calibrations of HRSE gage

3 Test Results and Comparisons

Voltage Output Calibration Tests

To make a comparison between oil-immersed calibrations and soil-embedded calibrations, one must assume that the pressure applied to the top of the gage is equivalent to the pressure in the fluid chamber of the test device shown in Figure 2.12. The results of the loading portion of a hydrostatic calibration of a particular gage can be compared with a soil-embedded calibration of the same gage by comparing the associated *Ca* values for loading. These comparisons are shown in Table 3.1.

The Ca values for the soil-embedded calibrations of LRSE gages are consistently lower than the *Ca* values from hydrostatic calibrations; with only one exception, the *Ca* values for calibrations on gages embedded in Yuma clayey sand or Vicksburg loess (silty clay) are less than those for gages embedded in flume sand. Again, the *Ca* values for HRSE gages embedded in the three soils are less than the *Ca* value from hydrostatic calibrations; with only two exceptions, the *Ca* value for either Yuma clayey sand or Vicksburg loess is less than the *Ca* value from the flume sand calibration of the same gage.

Figure 3.1 compares typical loading and unloading results for LRSE gage calibrations; typical results for HRSE gages are compared in Figure 3.2. Linear elastic behavior is clearly evident in the hydrostatic calibrations of both the LRSE and HRSE gages. The loading portions of the soil-embedded calibrations on both LRSE and HRSE gages are slightly nonlinear; the unloading portions, however, are highly nonlinear. This produces significant hysteresis in the load-unload cycles, especially for the LRSE gage calibrations; HRSE gages display the same hysteretic behavior as LRSE gages during unloading but not to the same magnitude.

As shown in Figure 3.3, linear behavior for reloading of soil-embedded LRSE gage calibrations was typical; it was also typical for HRSE gage calibrations. The reloading cycle was linear in behavior from the initiation point on the unloading

cycle to the previous point of maximum applied stress. This linear reloading is characteristic of calibration tests run in each of the three soils.

Strain Output Calibration Tests

Oil-immersed calibrations

A typical loading cycle for the individual strain gages in a LRSE gage under hydrostatic loading is shown in Figure 3.4. The individual strain gages of the LRSE gages were linear in behavior for loading and unloading. Typically the edge strain gages were placed in compression to a magnitude that was half of that of the center gages, which were in tension. Figure 3.5 shows the total strain loading and unloading cycle from a hydrostatic calibration of a LRSE gage. Linear behavior is evident in both the loading and unloading portions of the total strain measurement.

The hydrostatic calibrations of the HRSE gages were not as repeatable as those for the LRSE gages. Load-unload output from the four individual strain gages in the bridge of a HRSE gage are shown in Figure 3.6; unlike the LRSE gages, all four strain gages record tensile strains. The magnitudes of bottom and top gages were not equivalent as they were in the hydrostatic calibrations of the LRSE gages. The combined or total strain results of loading and unloading are presented in Figure 3.7. The loading portion is essentially linear; the unloading portion is slightly nonlinear, producing some hysteresis in the load-unload cycle.

Soil-embedded calibrations

Strain output tests were conducted on both LRSE and HRSE gages embedded in flume sand. Both gage types were tested with and without a confining ring. LRSE gages were oriented for both vertical and horizontal measurements, while the HRSE gage was tested only when oriented for vertical measurements. The orientations for the LRSE and HRSE gages are shown in Figures 2.13 and 2.14, respectively. Typical results for each orientation are presented herein along with results of tests conducted with and without a confining ring.

As with the voltage output calibration tests, slight nonlinear behavior is evident in the loading portions of the LRSE strain gage records for soil-embedded calibrations. The individual strain gage output from an LRSE gage during the loading cycle, with and without a confining ring, and oriented for vertical stress measurement, are shown on Figures 3.8 and 3.9. A with/without confining ring comparison of the total strain output from a LRSE gage oriented for vertical stress measurement is presented in Figure 3.10. The load-unload cycles in these flume sand calibration tests are very hysteretic in nature. There is little effect, however, on the loading or unloading response of the LRSE gage due to the confining ring.

The individual strain output from a LRSE gage placed for horizontal stress measurements is displayed in Figure 3.11 for a calibration test with a confining ring, and in Figure 3.12 for a test without a confining ring. It should be noted

that the vertical stress plotted in those figures is not the pressure applied to the sensing face of the gage, but is the pressure applied to the surface of the soil sample. The horizontal stress or pressure applied to the sensing face of the gage is a function of the vertical stress applied to the surface of the sample and the UX stress path shown in Figure 2.2. Total strain measurements from a LRSE gage oriented for horizontal measurement with and without a confining ring are compared in Figure 3.13. When the LRSE gages are oriented for horizontal stress measurement, there is a large difference in total strain output for gages calibrated in soil with and without the confining ring. The total strain for the gage with the confining ring is consistently higher during both loading and unloading than for the gage without the confining ring. Again, only slight nonlinear behavior is evident during loading; but, significant hysteresis is apparent in the unload cycle due to the highly nonlinear behavior during unloading.

HRSE soil-embedded gage calibrations have more scatter than the LRSE gage data. Individual strain gage loading results are plotted versus vertical stress or pressure for a HRSE gage with the confining ring in Figure 3.14, and without the confining ring in Figure 3.15. The difference in the output from the center gages is negligible, but the difference in the response of the edge gages is significant. The edge gages in the tests with a confining ring recorded a tensile strain, whereas the edge gages in the test without a confining ring recorded compressive strains. The total response is shown in Figure 3.16. The total strain output with and without the confining ring is effectively the same up to about 2000 psi of pressure. Above 2000 psi, the total strain output is less in the gage with the confining ring. Hysteresis is evident in the load-unload cycle for the HRSE gage, but not to the degree displayed in the load-unload behavior of the LRSE gages.

Table 3.1
Comparison of Oil-Immersed and Soil-Embedded Calibration Constants for Loading

Gage Type	Serial Number	Calibration Constants (Ca) for Loading			
		Hydraulic Oil	Flume Sand	Clayey Sand	Silty Clay
LRSE	6-3955-84	2980.2	3016.1 (Avg of 6)	2925.3 (Avg of 6)	2651.5 (Avg of 3)
	2-3692-84	3170.3	2949.7	2715.9	2810.5
	2-3694-84	3161.8	2880.0	3173.5	2838.9
	2-3703-84	3497.3	3466.0	3446.4	3150.1
	2-3710-84	3431.0 (Avg of 7)	3211.5	3113.7	2879.4
	9-3603-83	3528.0	3099.3	3057.2	2881.9
	9-3611-83	3670.1	3551.1	3106.2	3170.3
HRSE	9-3968-84	15629.5	14837.1	13890.9	
	8-3940-84	15079.4 (Avg of 7)		12368.6 (Avg of 6)	
	8-3941-84	14287.2	13209.6	13923.2	
	8-3951-84	16100.2	15636.8	12771.0	
	10-3633-83	13298.0			
	10-3627-83	11981.0			9969.7
	10-3630-83	13540.6	12306.5	9508.5	11584.9
	6-3515-83	12790.5	11777.6	9772.9	11348.3
	6-3518-83	12143.1			12028.8
	10-3620-83	12242.8			8927.3
	10-3623-83	11633.5			9653.5 (Avg of 4)
	10-3625-83	12566.7	11157.5	11655.6	9996.6
	10-4000-84	14064.0 (Avg of 7)	12991.5 (Avg of 6		

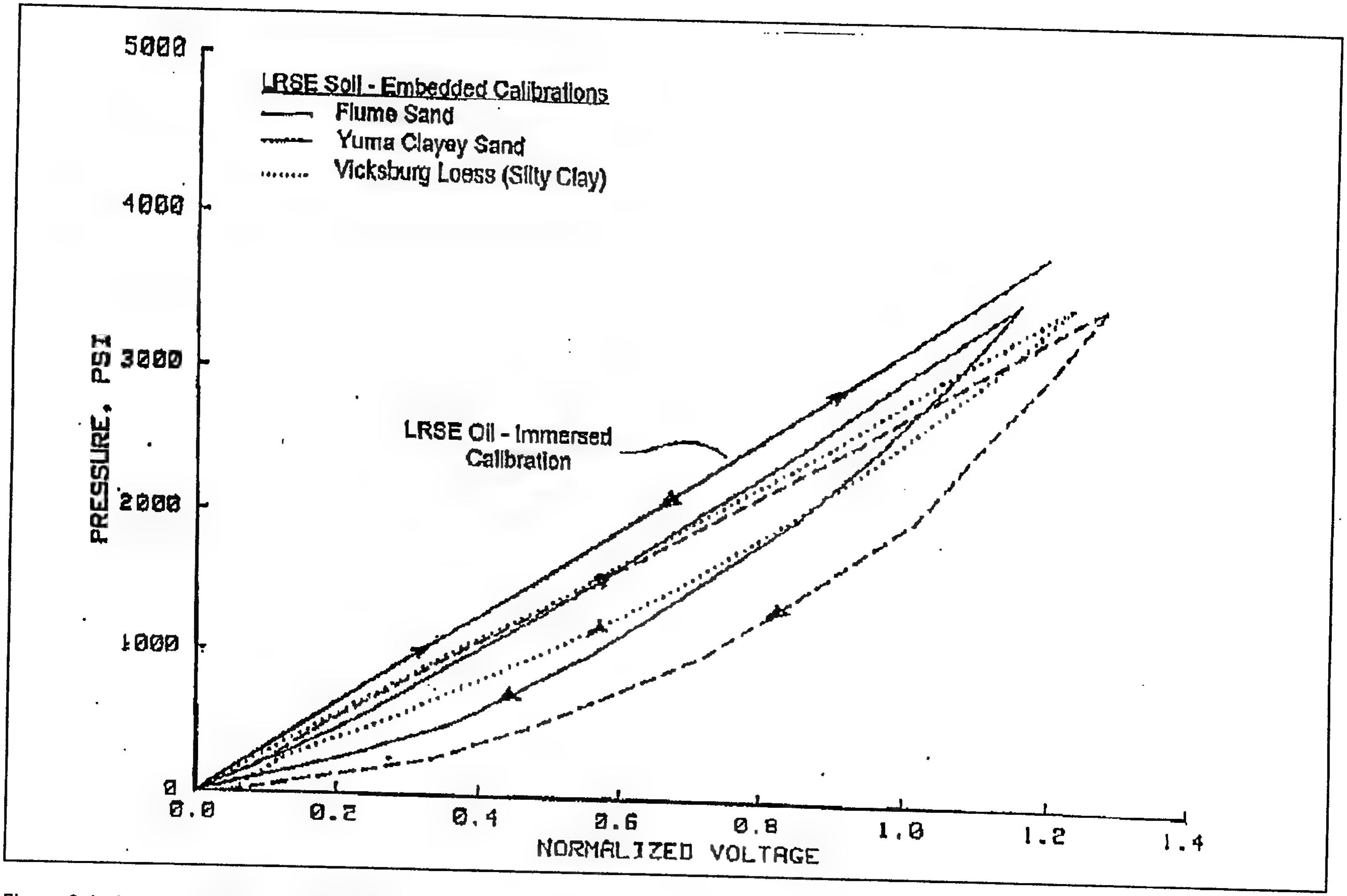


Figure 3.1. Typical loading and unloading results from calibrations of a LRSE gage

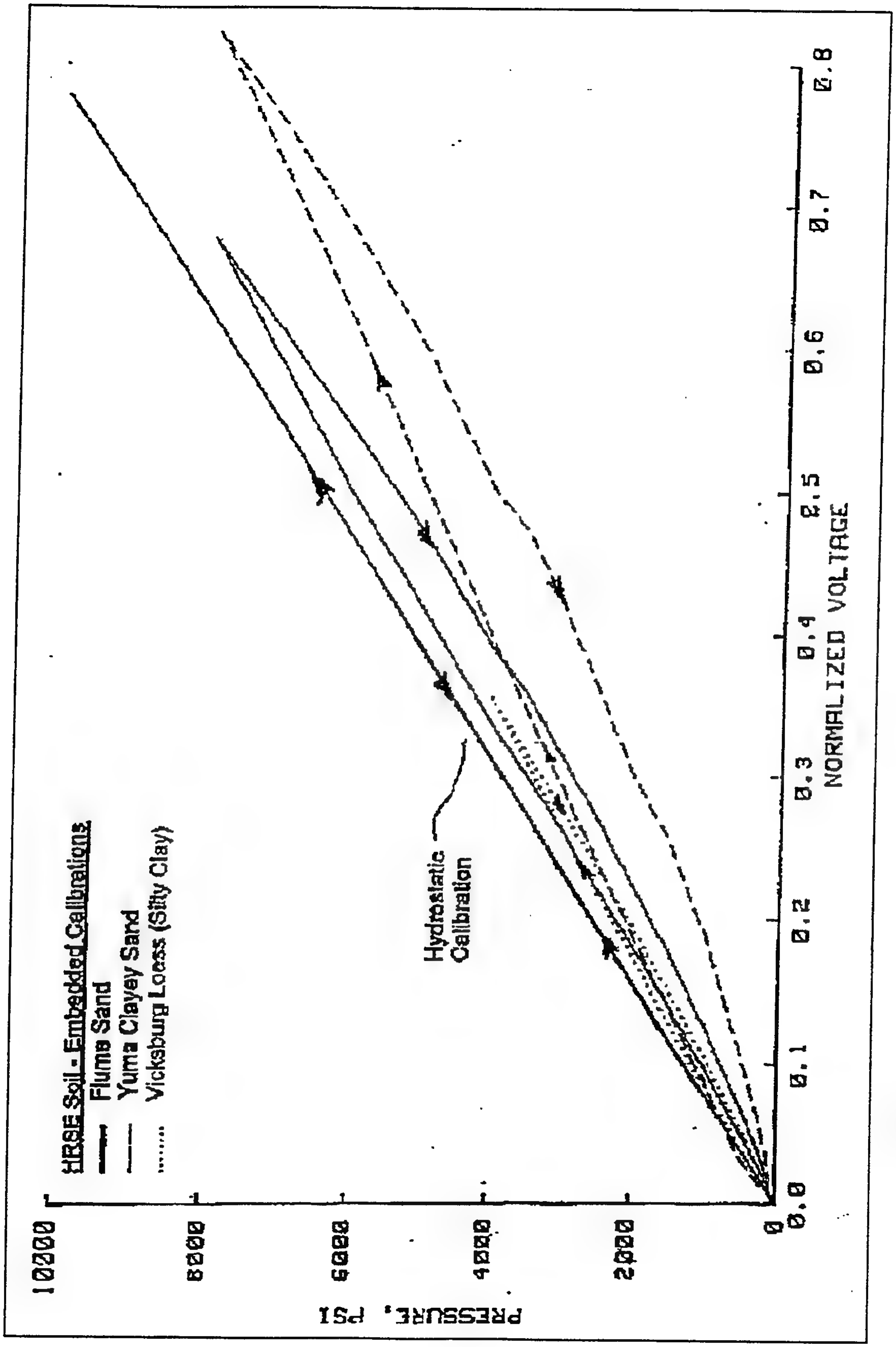


Figure 3.2. Typical loading and unloading results from calibrations of a HRSE gage

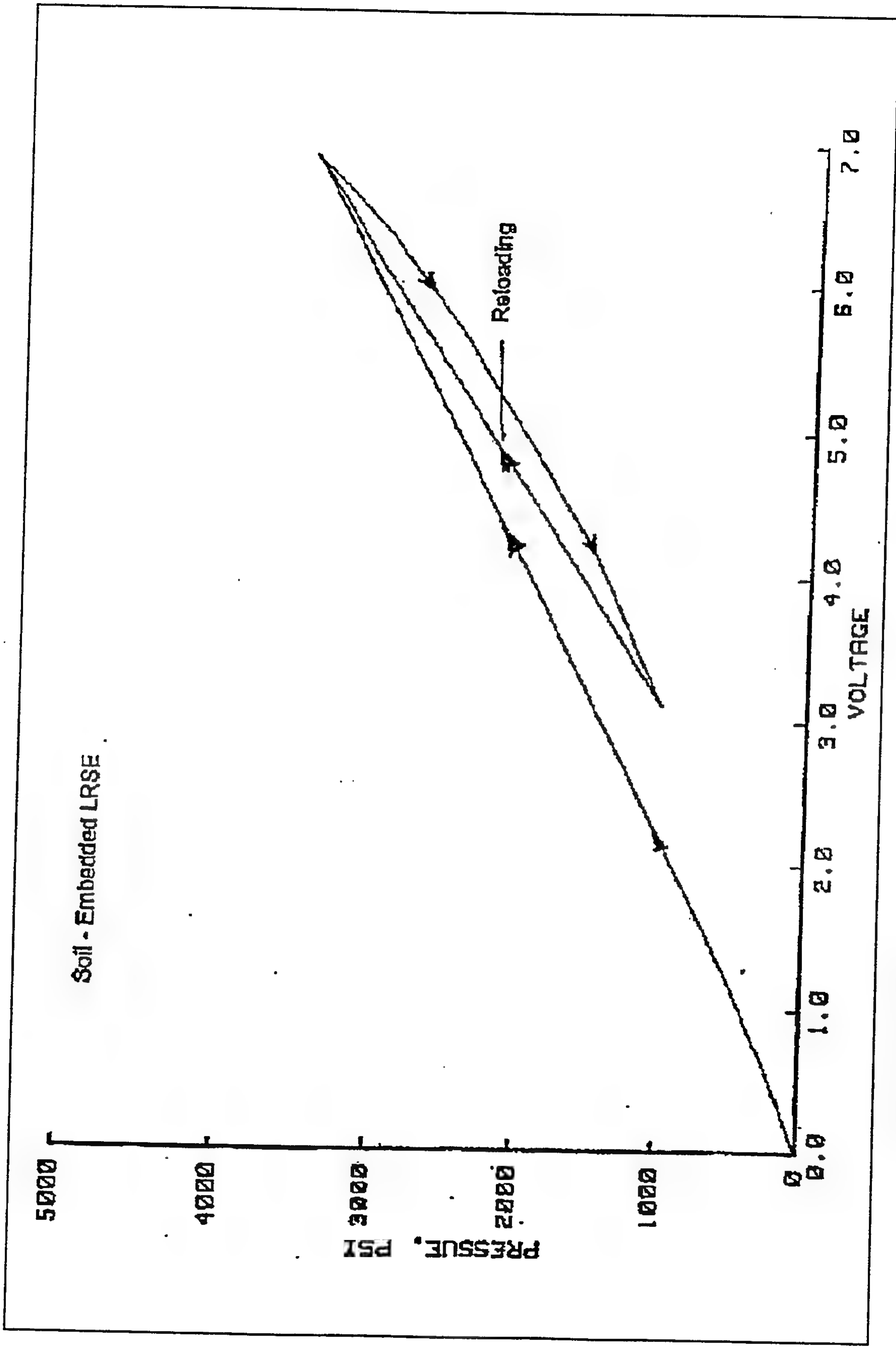


Figure 3.3. Typical soil-embedded calibration of a LRSE gage with a linear reloading cycle

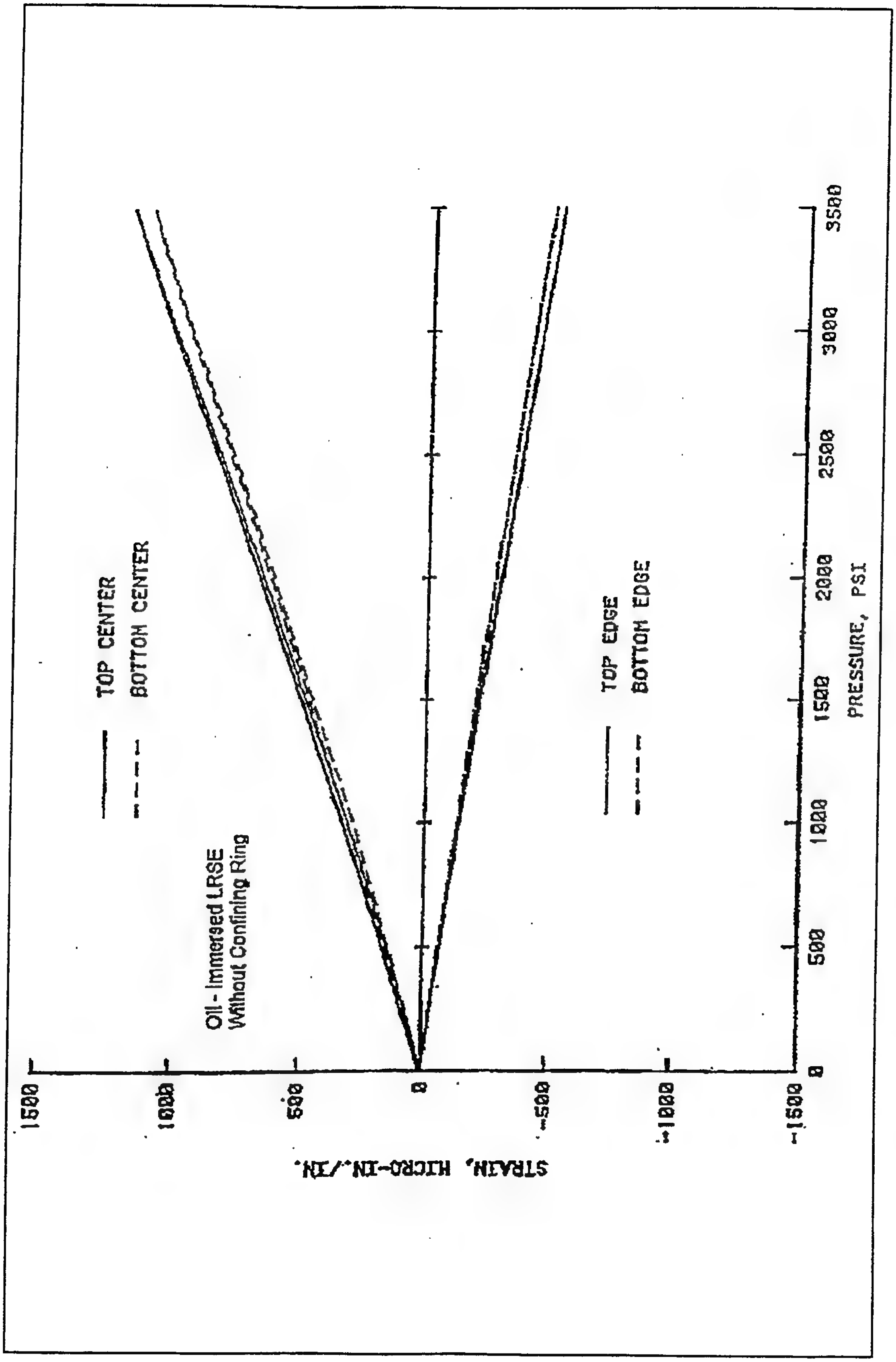


Figure 3.4. Individual strain gage measurements from hydrostatic calibration of a LRSE gage

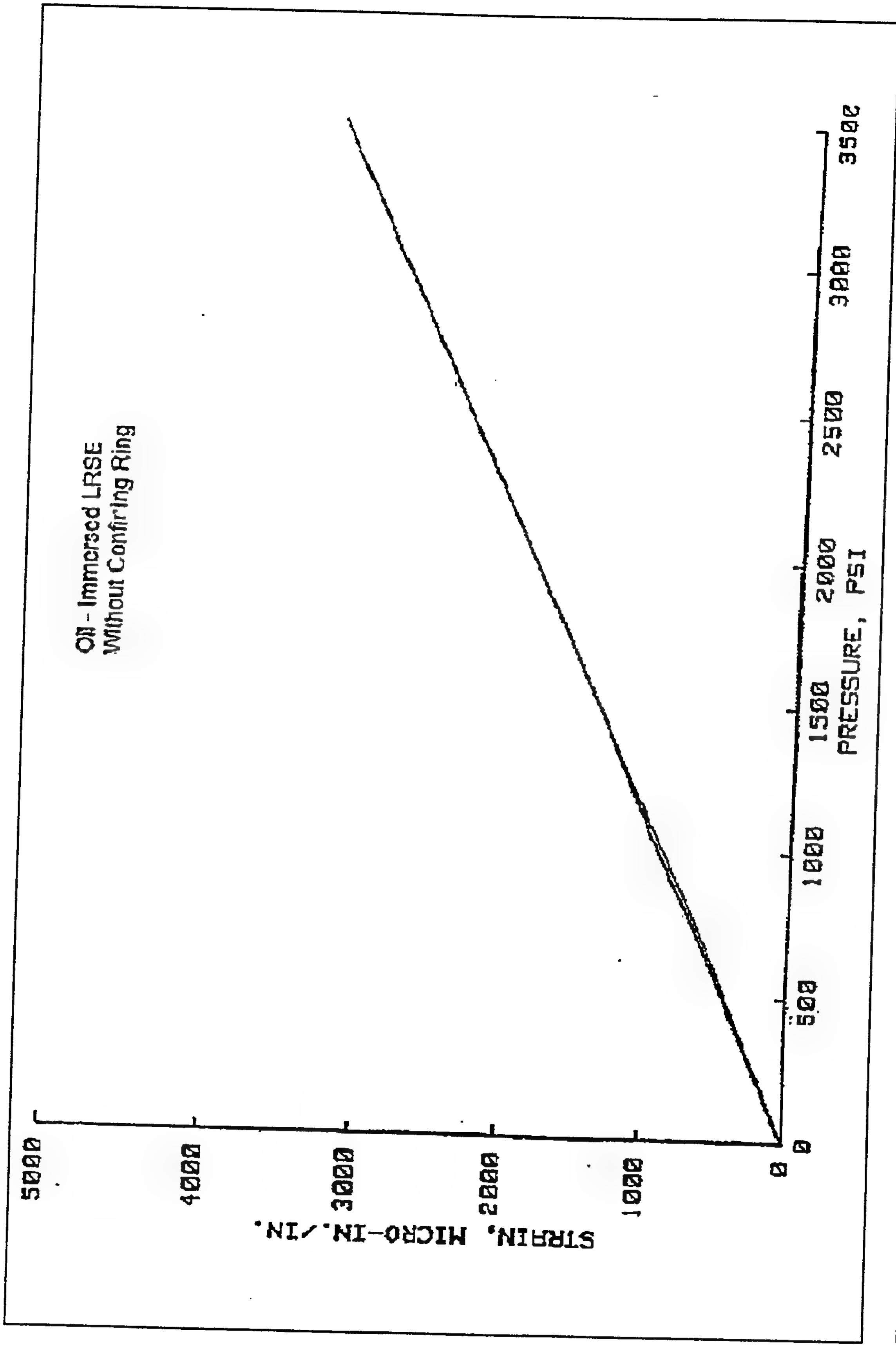


Figure 3.5. Total strain measurement from hydrostatic calibration of a LRSE gage

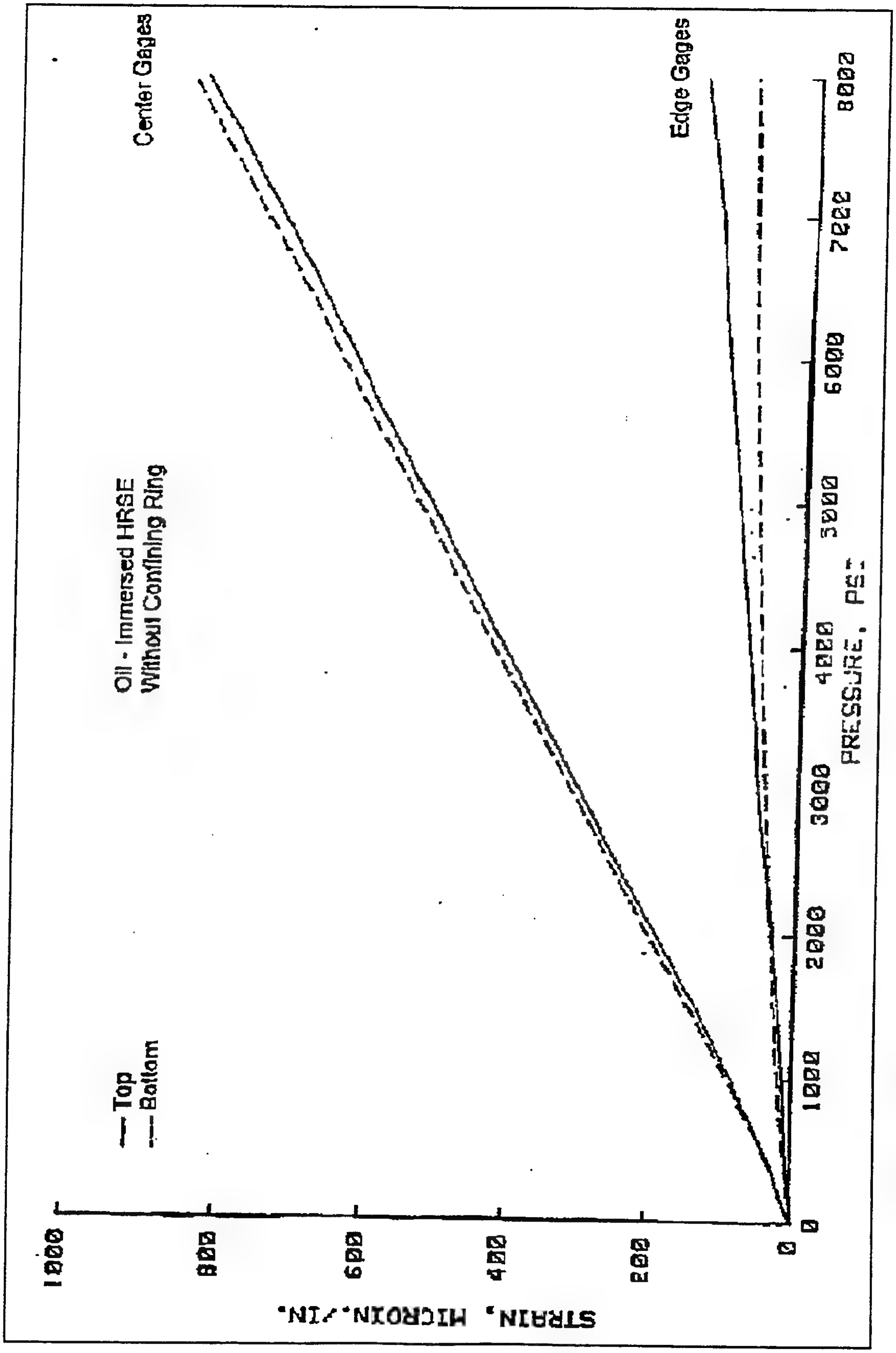


Figure 3.6. Individual strain gage measurements from hydrostatic calibration of a HRSE gage

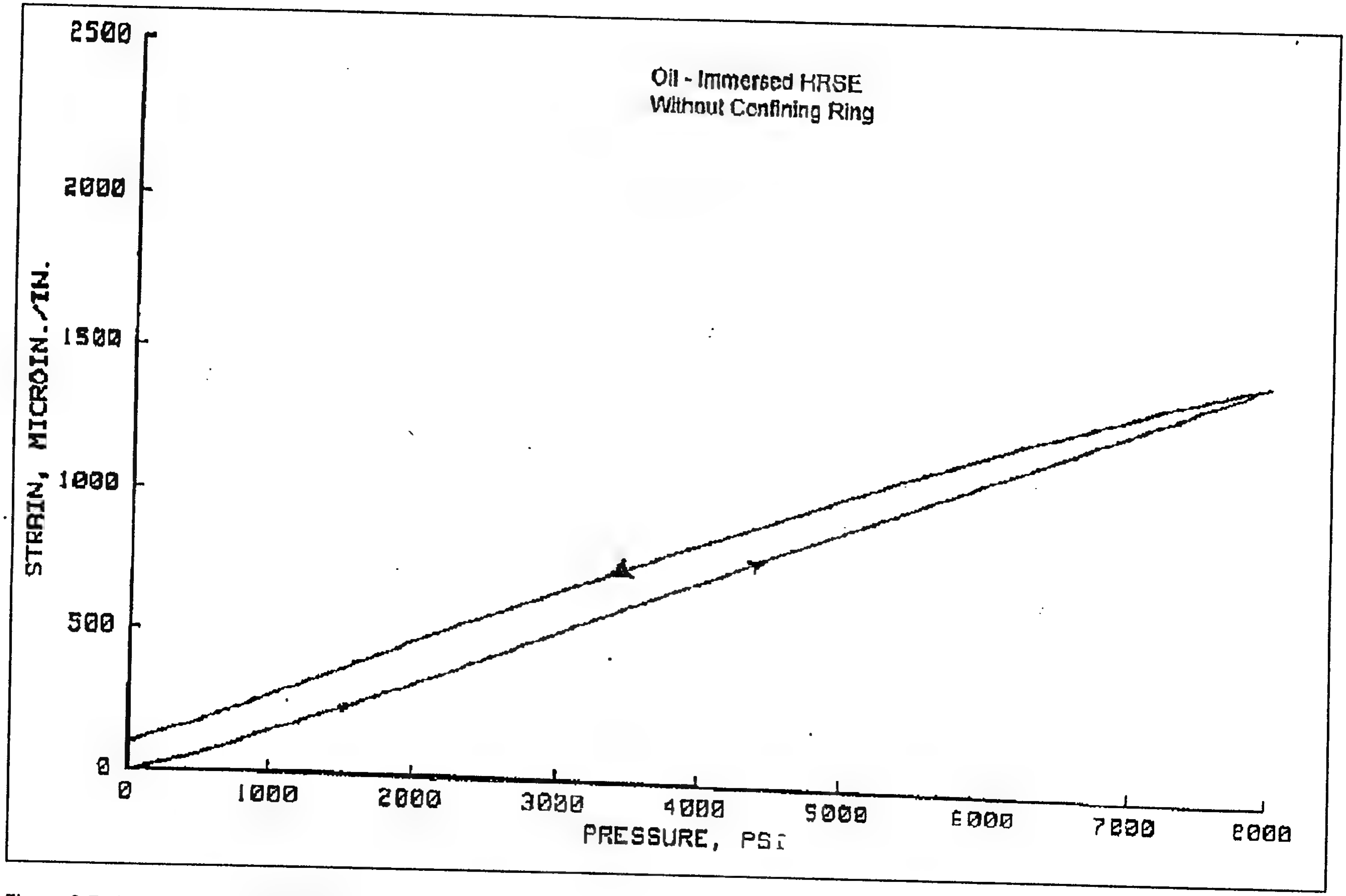


Figure 3.7. Total strain measurement from hydrostatic calibration of a HRSE gage

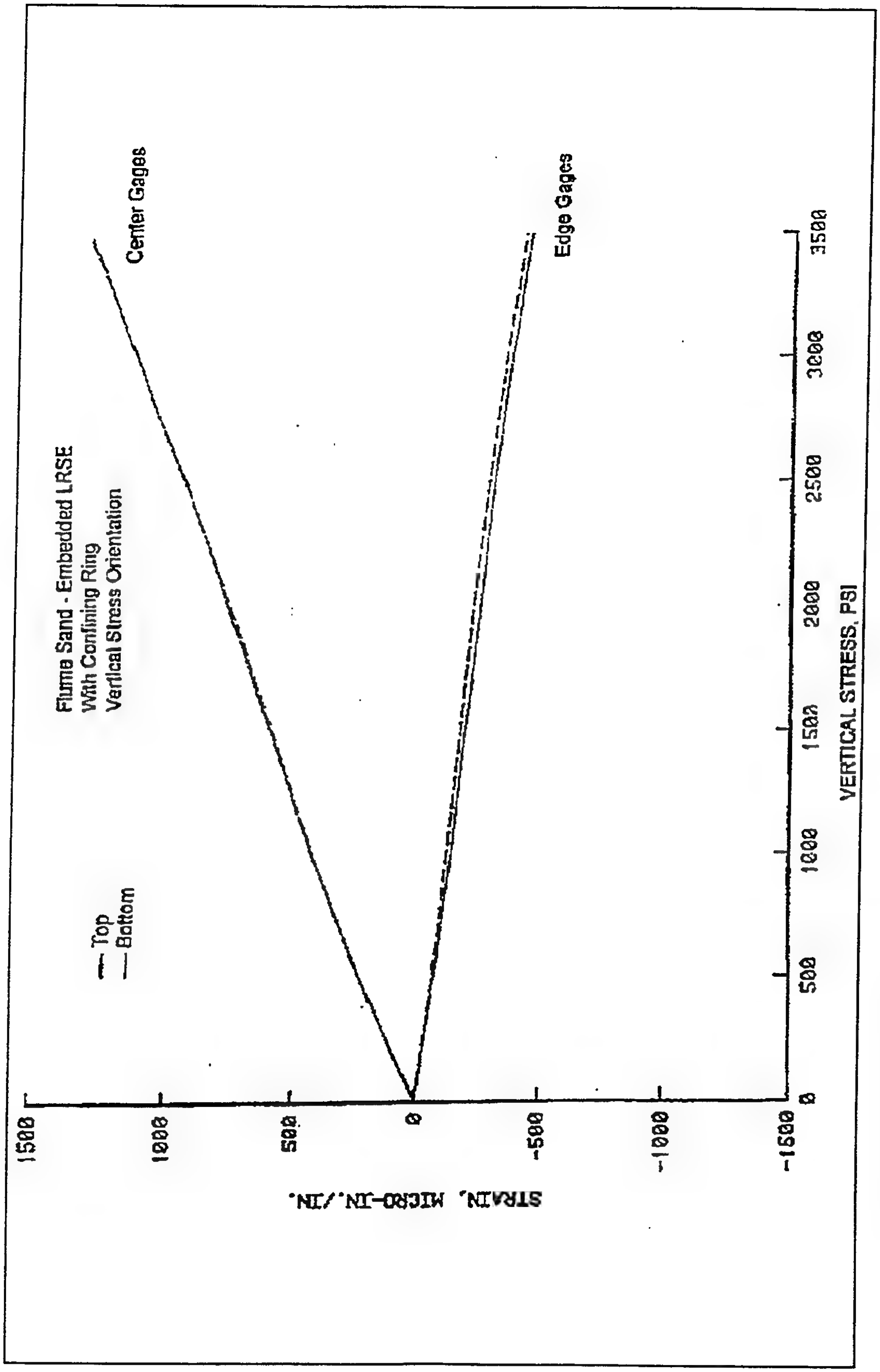


Figure 3.8. Individual strain gage measurements from flume sand-embedded calibration of a LRSE gage with a confining ring (oriented for vertical stress measurement)

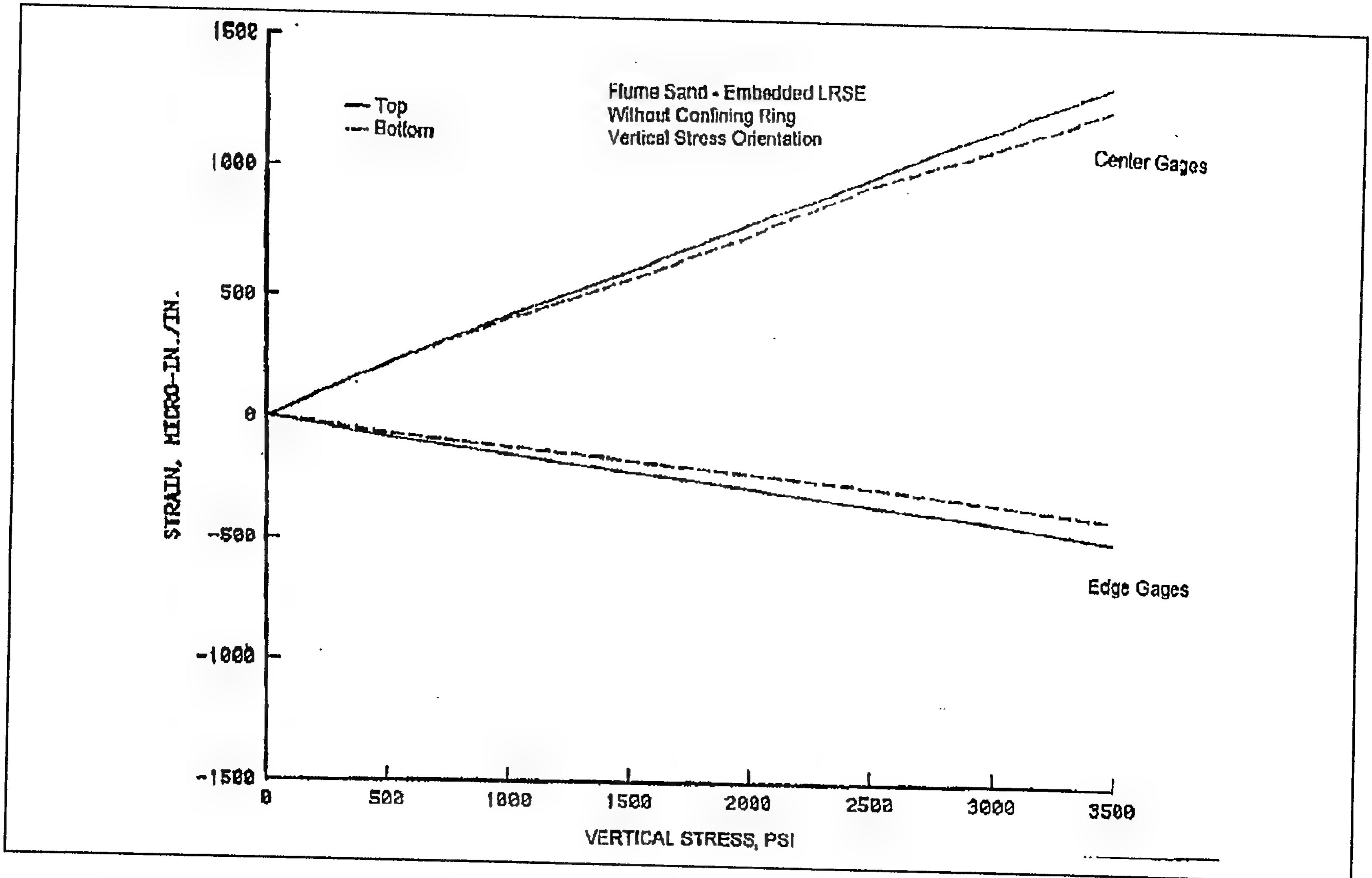


Figure 3.9. Individual strain gage measurements from flume sand-embedded calibration of a LRSE gage without a confining ring (oriented for vertical stress measurement)

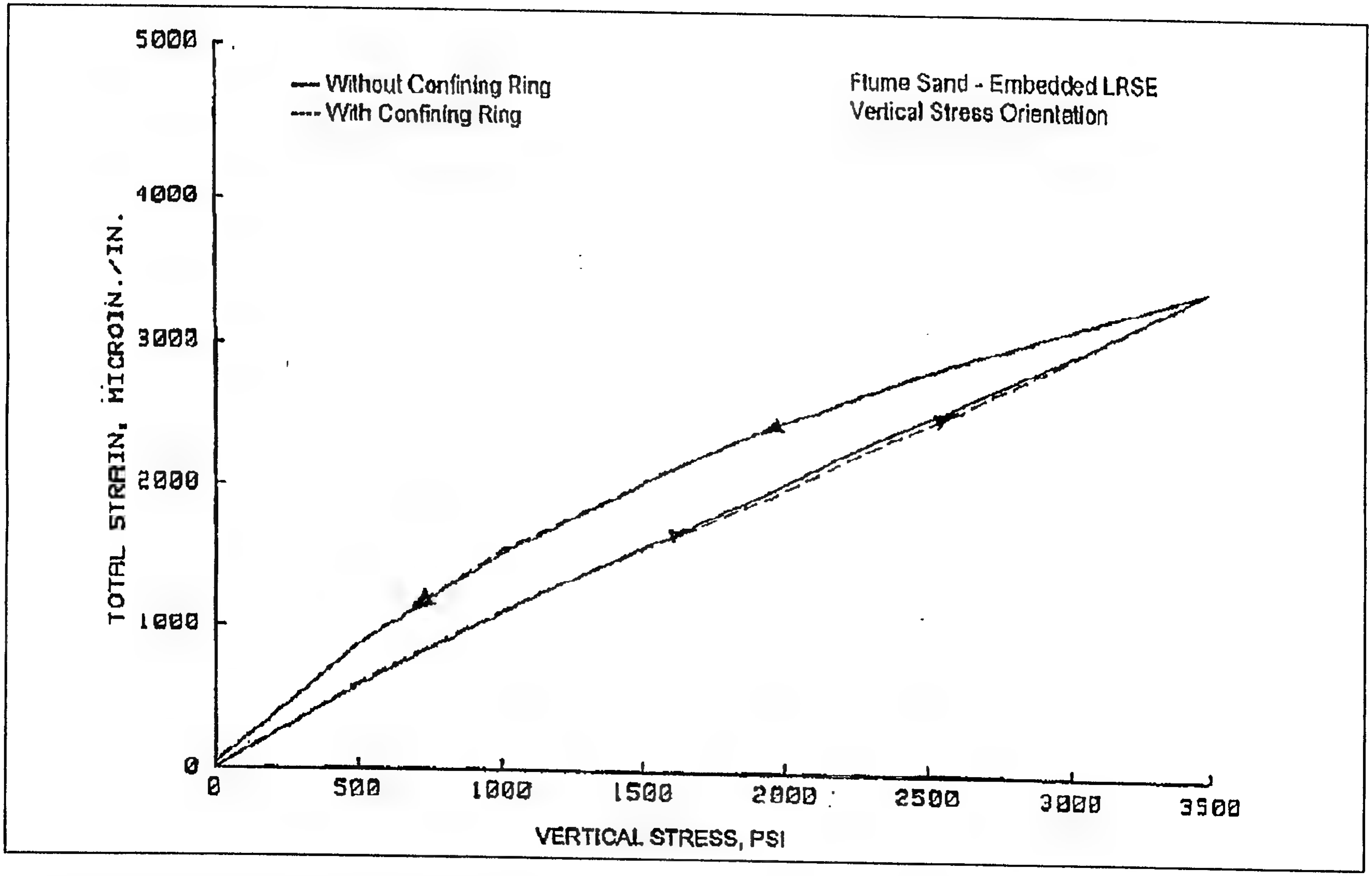


Figure 3.10. Comparison of total strain measurements from flume sand-embedded calibrations of a LRSE gage with and without a confining ring (oriented for vertical stress measurement)

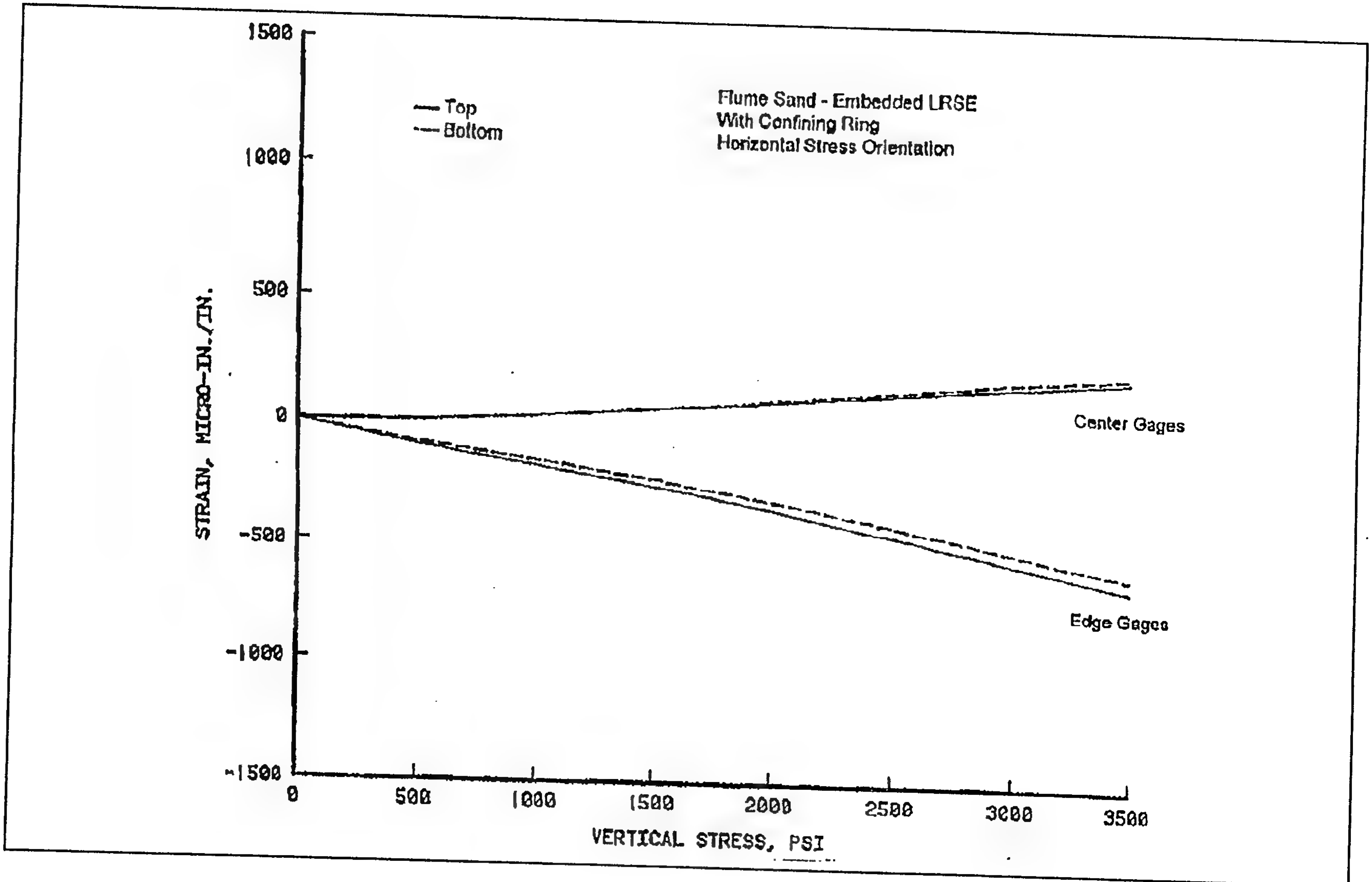


Figure 3.11. Individual strain measurements from flume sand-embedded calibration tests of a LRSE gage with a confining ring (oriented for horizontal stress measurement)

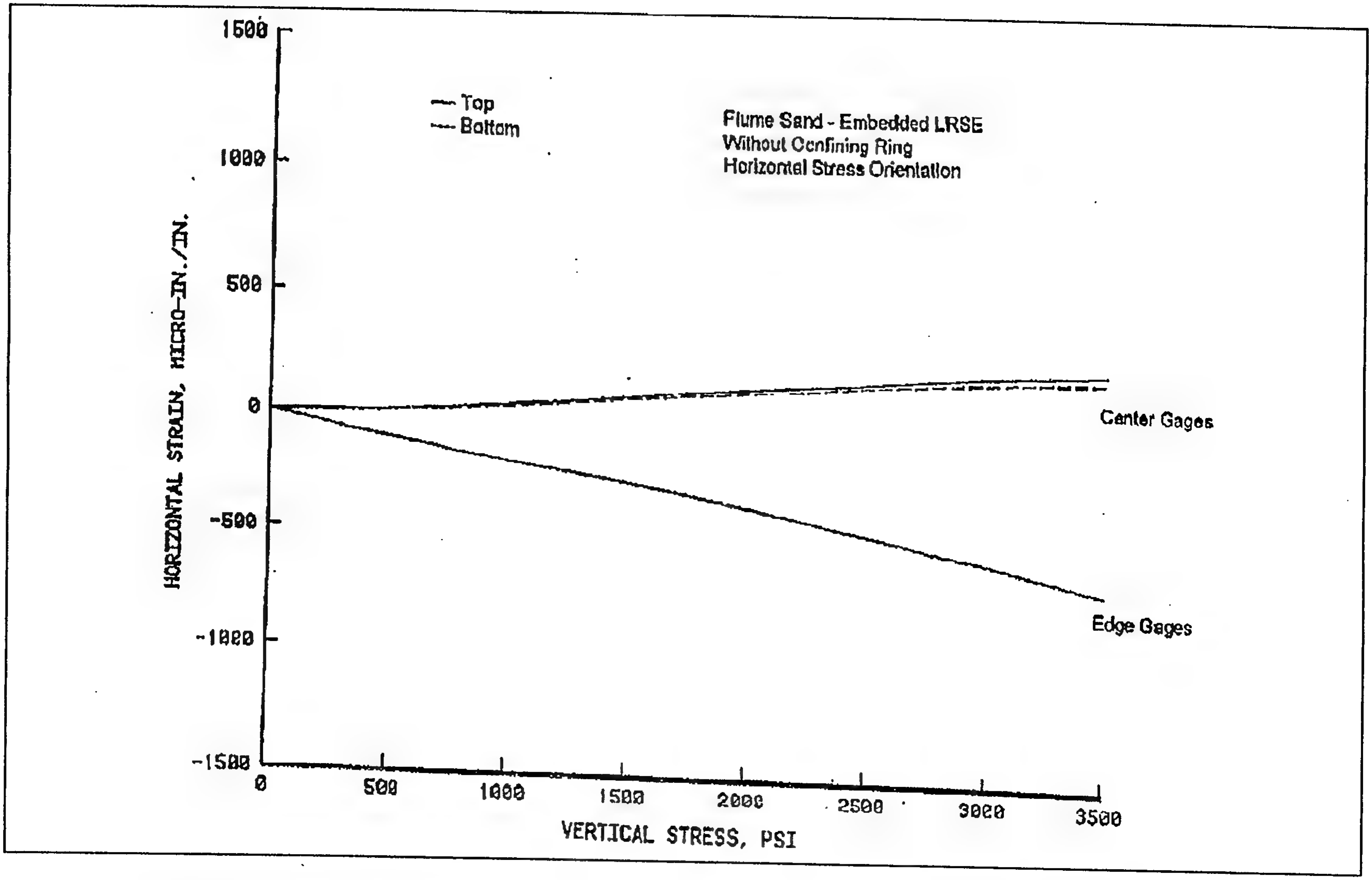


Figure 3.12. Individual strain gage measurements from flume sand-embedded calibration tests without a confining ring (oriented for horizontal stress measurement)

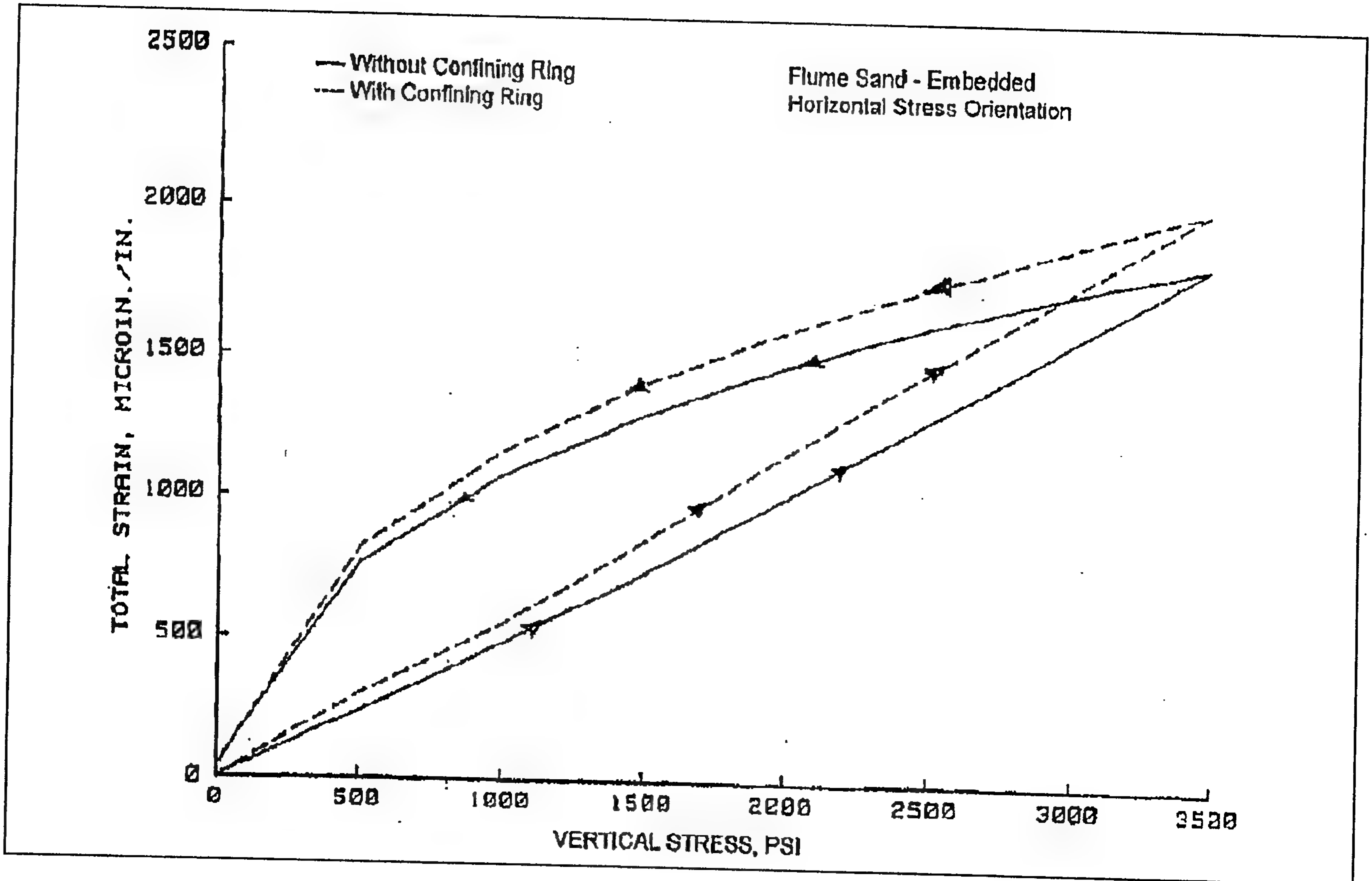


Figure 3.13. Comparison of total strain measurements from flume sand-embedded calibrations of a LRSE gage (oriented for horizontal stress measurement)

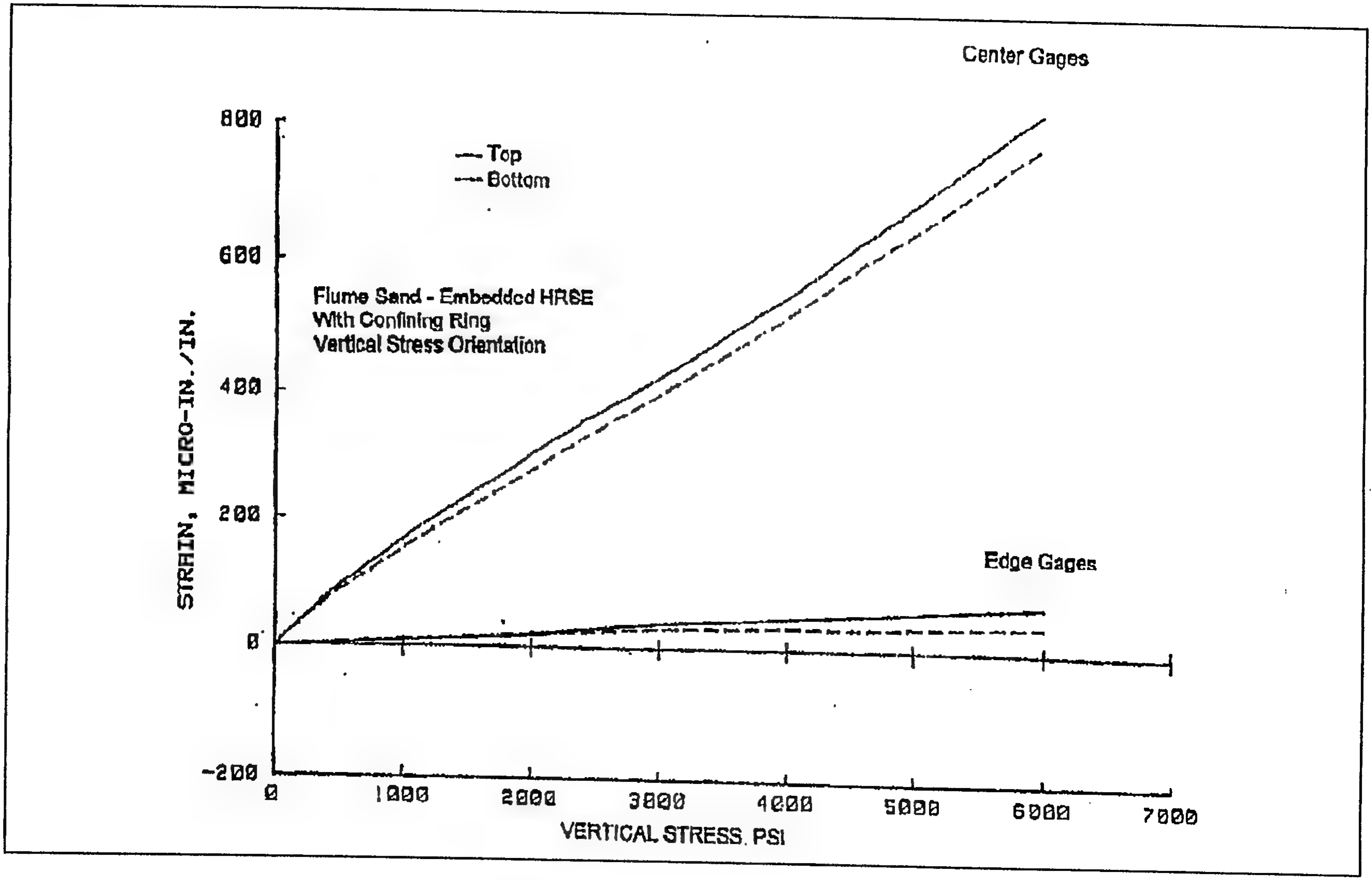


Figure 3.14. Individual strain gage measurements from flume sand-embedded calibration tests of a HRSE gage with a confining ring (oriented for vertical stress measurement)

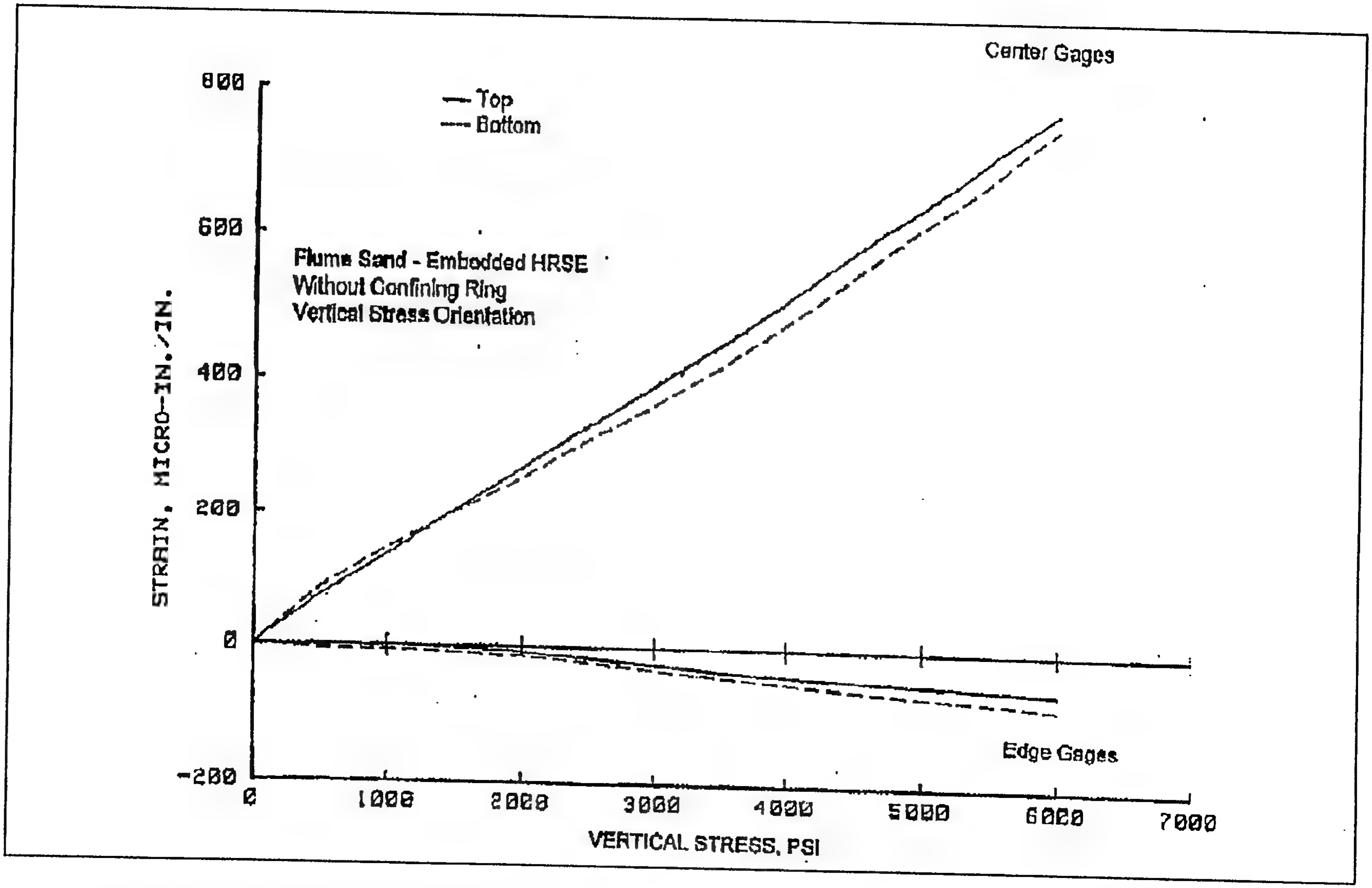


Figure 3.15. Individual strain gage measurements from flume sand-embedded calibration tests of a HRSE gage without a confining ring (oriented for vertical stress measurement)

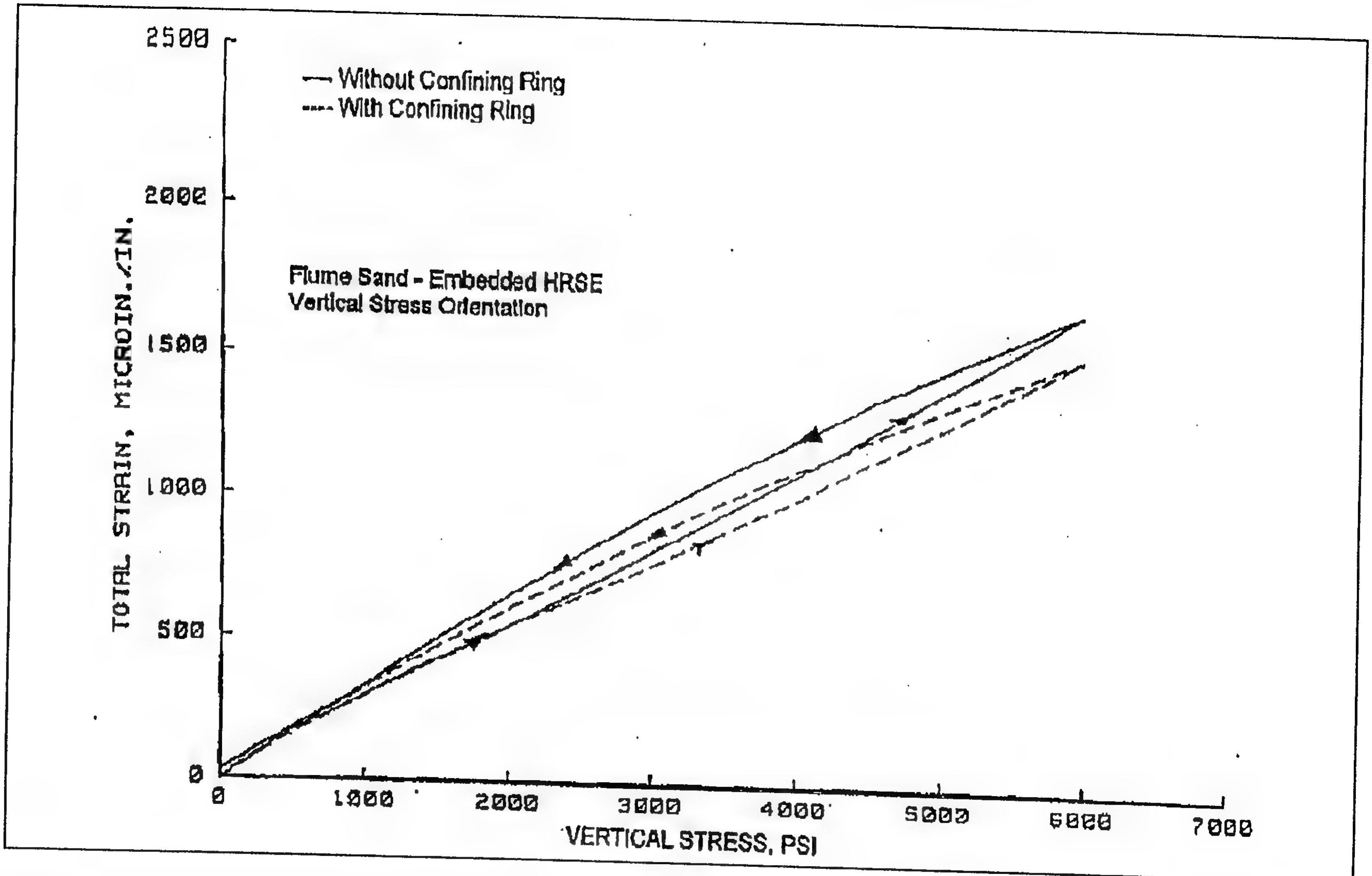


Figure 3.16. Comparison of total strain measurements on flume sand-embedded calibration tests of a HRSE gage with and without a confining ring (oriented for vertical stress measurements)

4 Summary

Calibration tests were conducted on HRSE and LRSE stress gages immersed in oil and embedded in soil. Three soil types were used: (1) flume sand, SP, (2) Yuma clayey sand, SC, and (3) Vicksburg loess (silty clay), CL. Calibration tests were conducted in which the voltage output of the gage was recorded. These soil-embedded calibration test results may be used to reduce the raw stress gage data from field tests more accurately than can be achieved using the standard oil-immersed calibrations. Stress gage calibration tests were also conducted in which the strain output from each of the four individual strain gages in the wheatstone bridge were recorded. The gages were oriented for both vertical and horizontal stress measurements, and calibration tests were conducted on the gages with and without confining rings. The results of these strain output tests can be directly compared with the results from finite element gage-simulation calculations.

A total of 70 calibration tests were conducted with gages immersed in oil. The load-unload curves from the hydrostatic calibrations in which voltage was recorded displayed linear elastic behavior. Response of the LRSE gage was essentially linear elastic for hydrostatic calibrations in which strain was the recorded output. But while the loading portion of the corresponding HRSE calibrations was essentially linear, the unloading portion was slightly nonlinear, resulting in some hysteresis in the load-unload cycle. The calibration constant or *Ca* values for HRSE gages were typically four times greater than the values obtained for LRSE gages.

Significant differences are seen in the results of the 187 soil-embedded calibrations. These differences were determined by gage type, soil type, and gage orientation. A slightly nonlinear loading curve typified all soil-embedded calibrations. The slope of the loading curve was dependent upon gage type and soil type. Major differences in response due to gage type and soil type were seen in the unloading curves from the soil-embedded calibration tests; hysteresis was a dominant characteristic of all load-unload cycles. The magnitude of the hysteresis was much greater for LRSE gages than for HRSE gages. LRSE gages calibrated in the Yuma clayey sand displayed the most hysteresis, whereas HRSE gages calibrated in Vicksburg loess (silty clay) were characterized by the least amount of hysteresis.

Reloading paths for all soil-embedded calibration tests were similar, i.e., the paths were linear from the beginning point of reloading to the previous point of maximum applied pressure. Neither soil type, gage type, nor gage orientation had a detectable effect on the reloading path.

The presence of a confining ring caused significant differences in response of the HRSE gage. Strain gages located on the edges of the HRSE gage diaphragms recorded tensile strains when a confining ring was present, and compressive strains when the confining ring was absent. The confining ring did not affect the results of a LRSE gage when placed for vertical stress measurement; however, when a LRSE gage was oriented for horizontal stress measurement, the total strain for the gages with the confining ring was consistently higher during both loading and unloading than for the gages without the confining ring.

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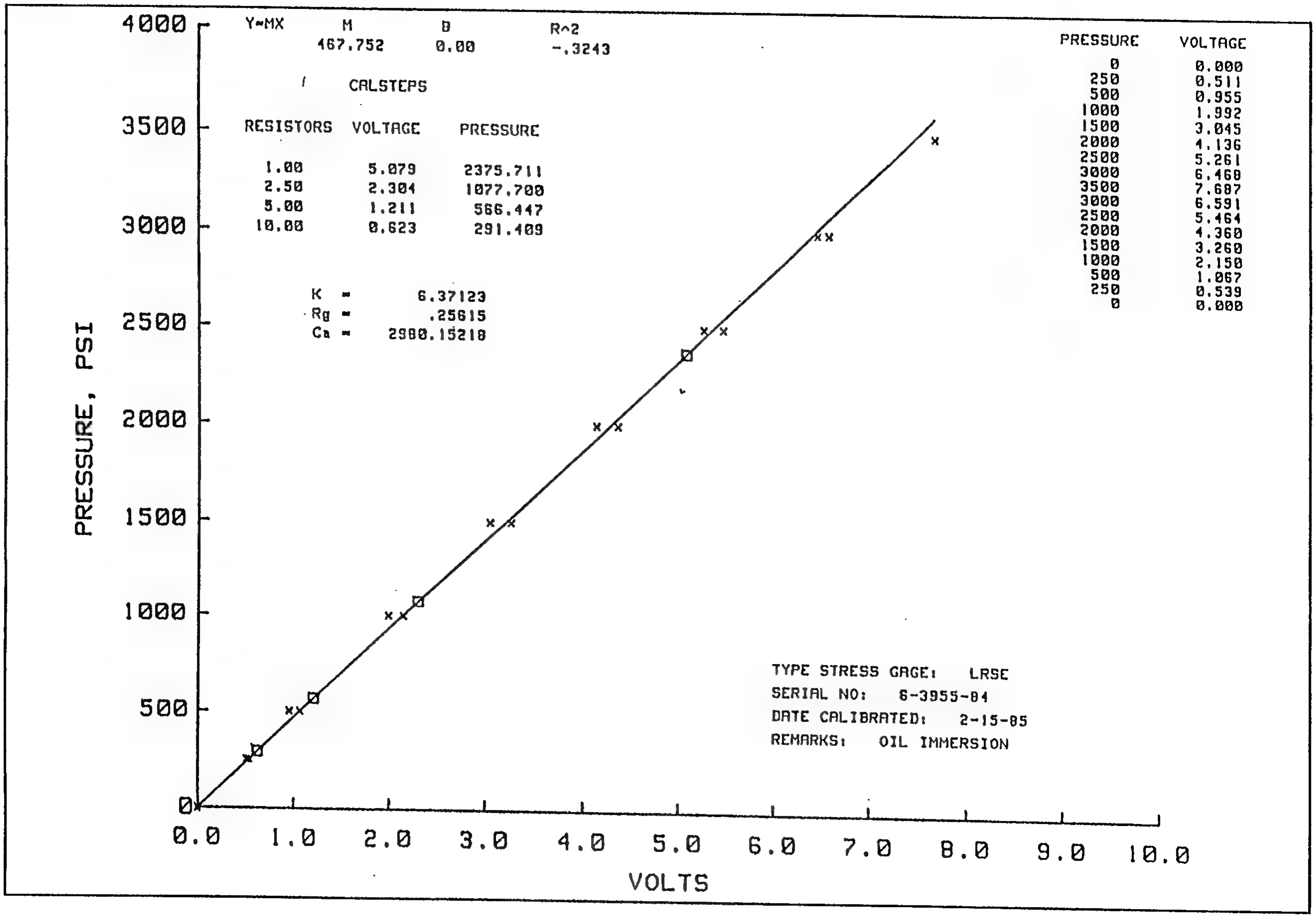
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B
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R^2
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5.00 1.211 566.447
10.00 0.623 291.409
K = 6.37123
Rg = .25615
Ca = 2980.15218
PRESSURE VOLTAGE
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500 0.955
1000 1.992
1500 3.045
2000 4.136
2500 5.261
3000 6.460
3500 7.687
3000 6.591
2500 5.464
2000 4.360
1500 3.260
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DATE CALIBRATED: 2-15-85
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PRESSURE, PSI
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1000
1500
2000
2500
3000
3500
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3.0
4.0
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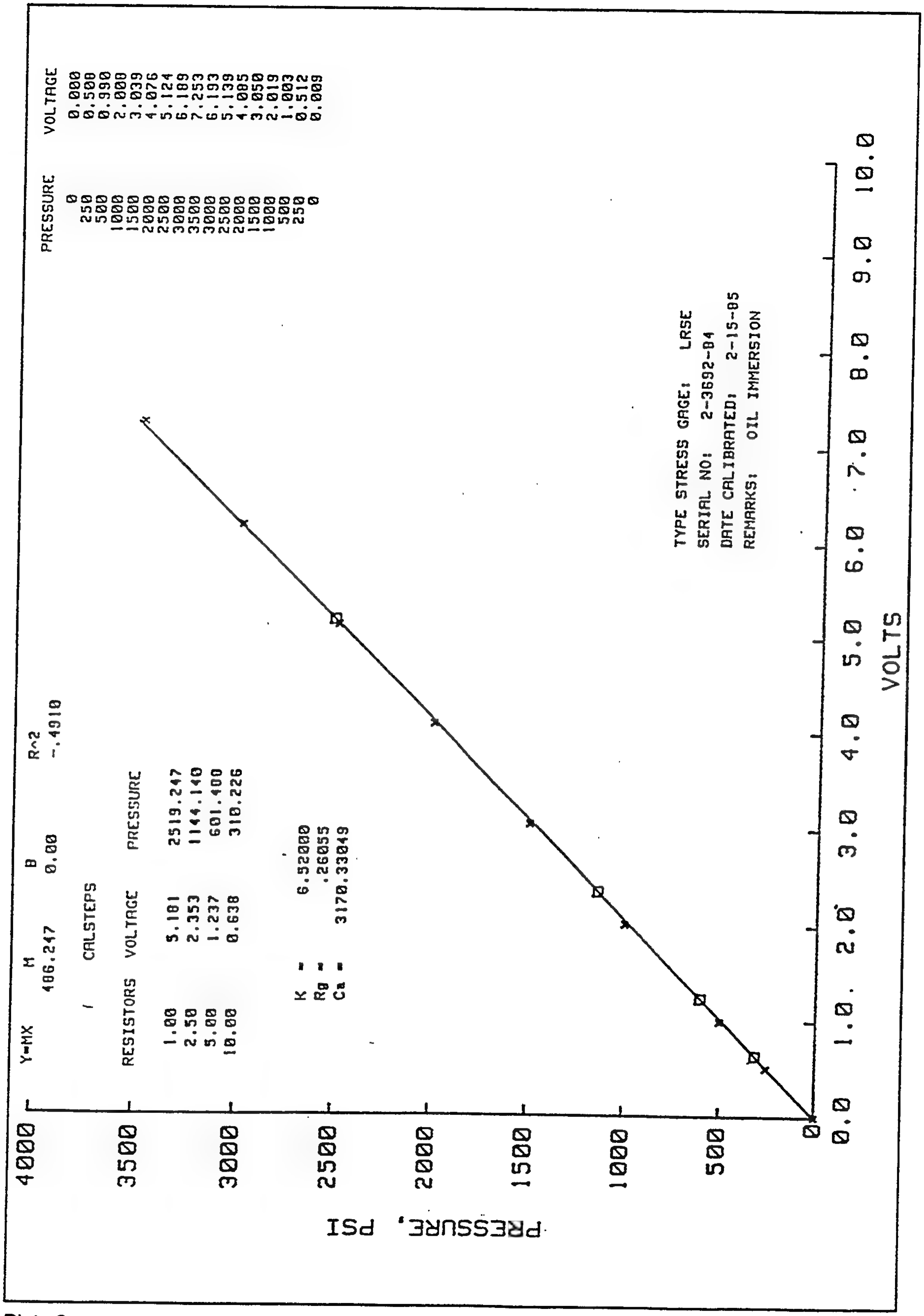
7.0
8.0
9.0
10.0

Plate 1



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PRESSURE, PSI
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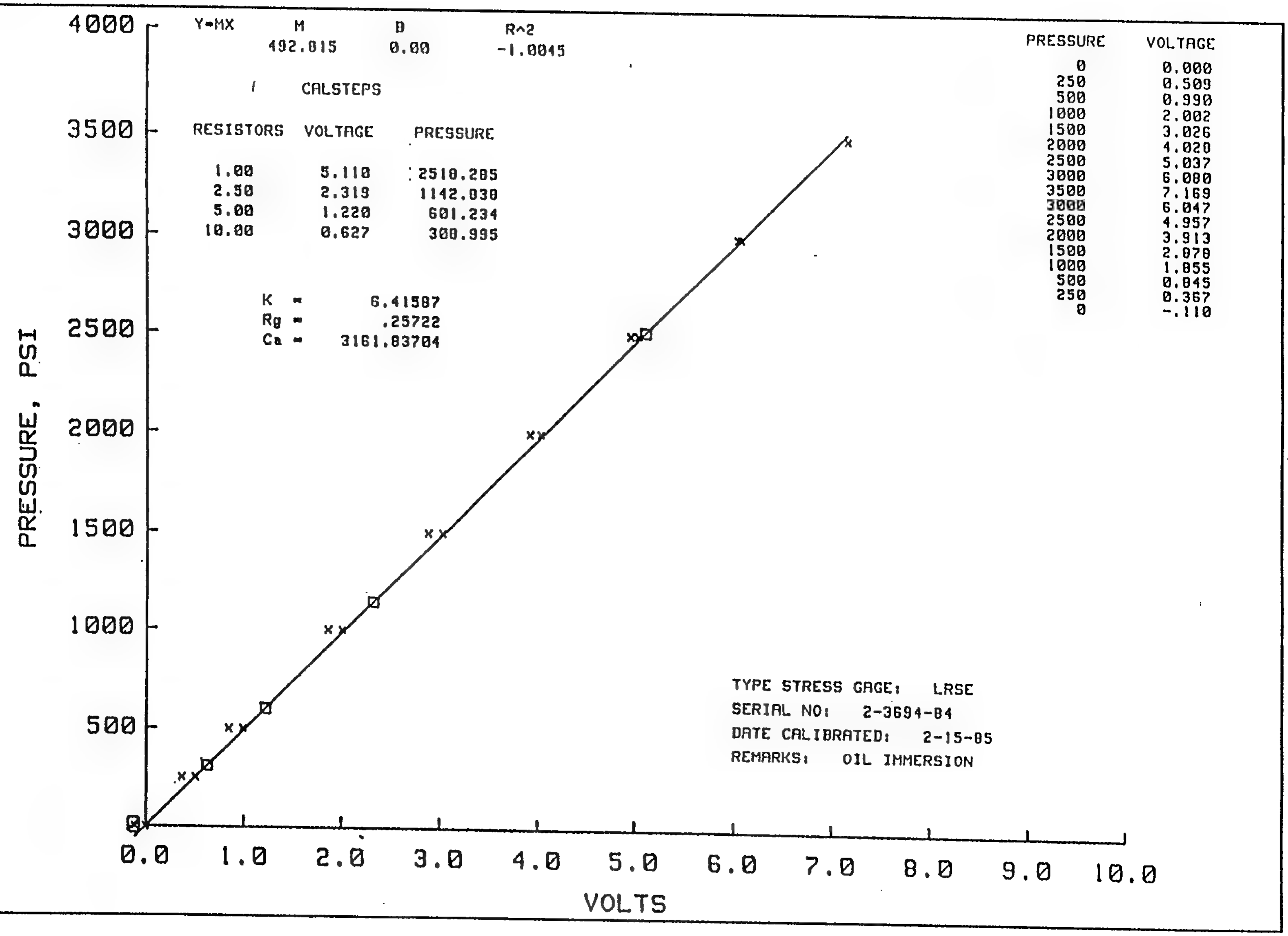
Plate 2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Ca = 3161.83704
PRESSURE VOLTAGE
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2500 5.037
3000 6.080
3500 7.169
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2500 4.957
2000 3.913
1500 2.878
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500 0.845
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DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
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3500
3000
2500
2000
1500
1000
500
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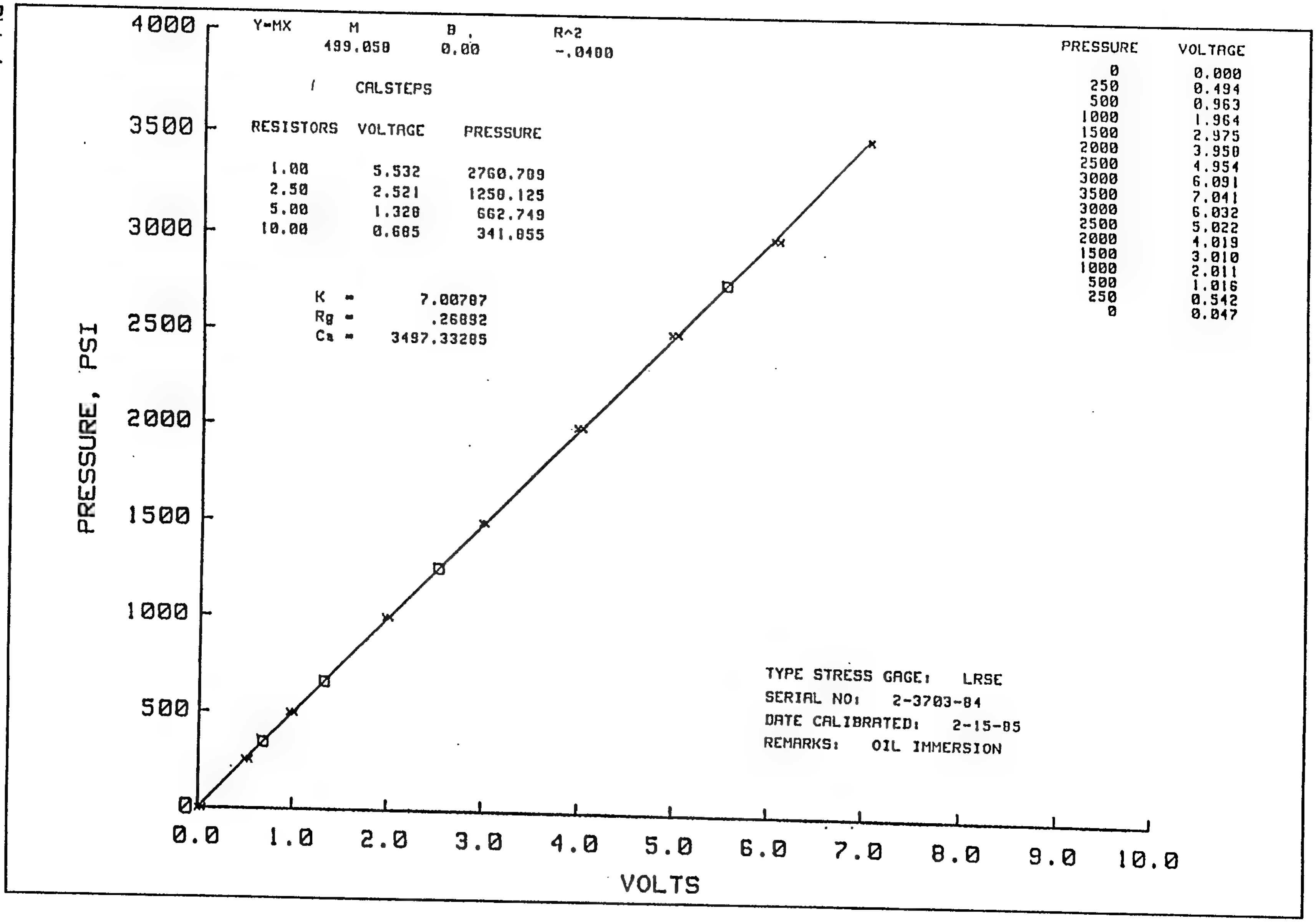
VOLTS

Plate 3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RESISTORS VOLTAGE PRESSURE
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5.00 1.320 662.749
10.00 0.685 341.855
K = 7.00787
Rg = .26892
Ca = 3497.33285
PRESSURE VOLTAGE
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250 0.494
500 0.963
1000 1.964
1500 2.975
2000 3.950
2500 4.954
3000 6.091
3500 7.041
3000 6.032
2500 5.022
2000 4.019
1500 3.010
1000 2.011
500 1.016
250 0.542
0 0.047
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3703-84
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
0
500
1000
1500
2000
2500
3000
3500
4000
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 4

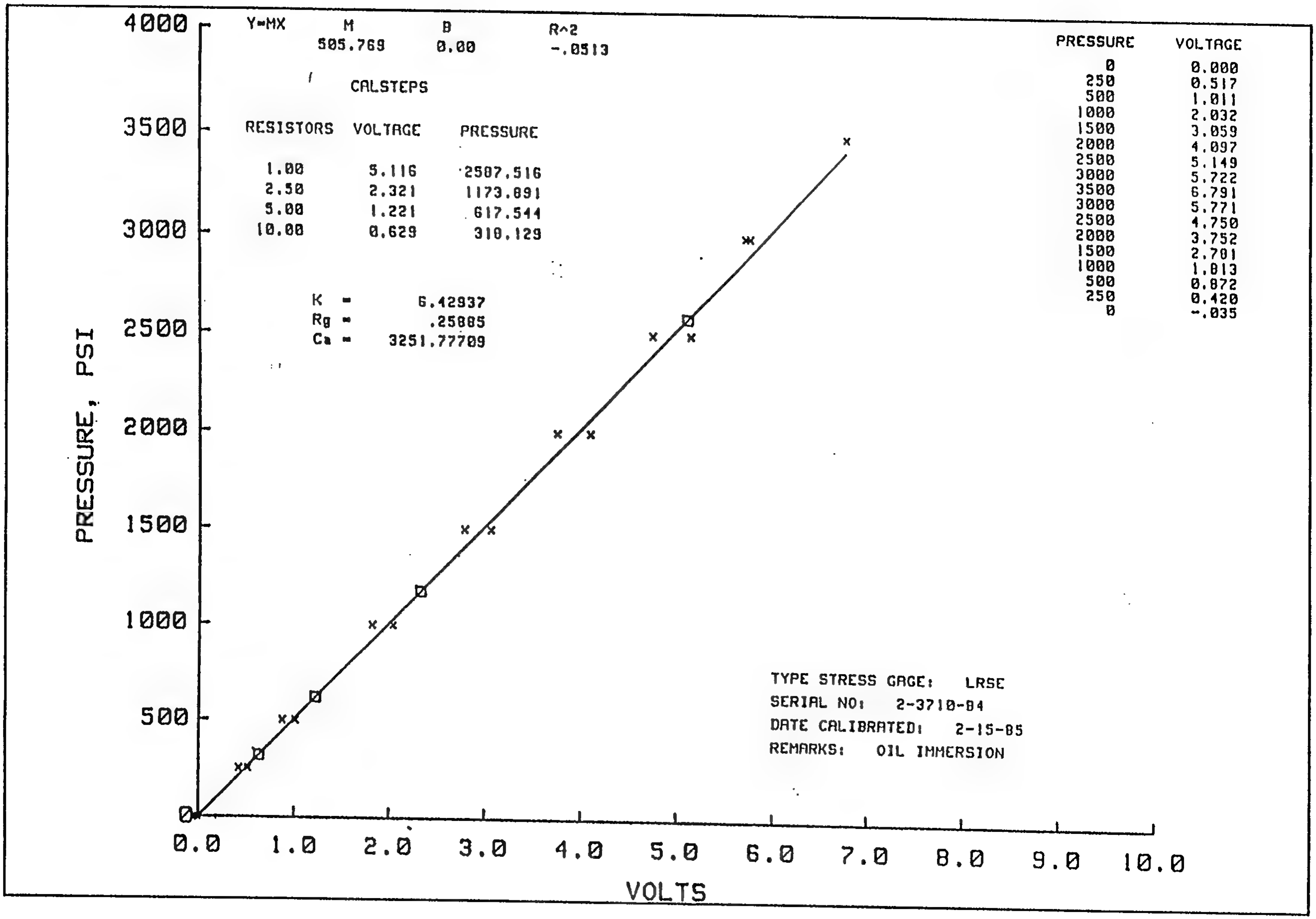

Y=MX M B R^2
505.769 0.00 -.0513
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.116 2587.516
2.50 2.321 1173.891
5.00 1.221 617.544
10.00 0.629 318.129
K = 6.42937
Rg = .25885
Ca = 3251.77709
PRESSURE VOLTAGE
0 0.000
250 0.517
500 1.011
1000 2.032
1500 3.059
2000 4.097
2500 5.149
3000 5.722
3500 6.791
3000 5.771
2500 4.750
2000 3.752
1500 2.701
1000 1.813
500 0.872
250 0.420
0 -.035
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-84
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
VOLTS
0 500 1000 1500 2000 2500 3000 3500 4000
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0

Plate 5

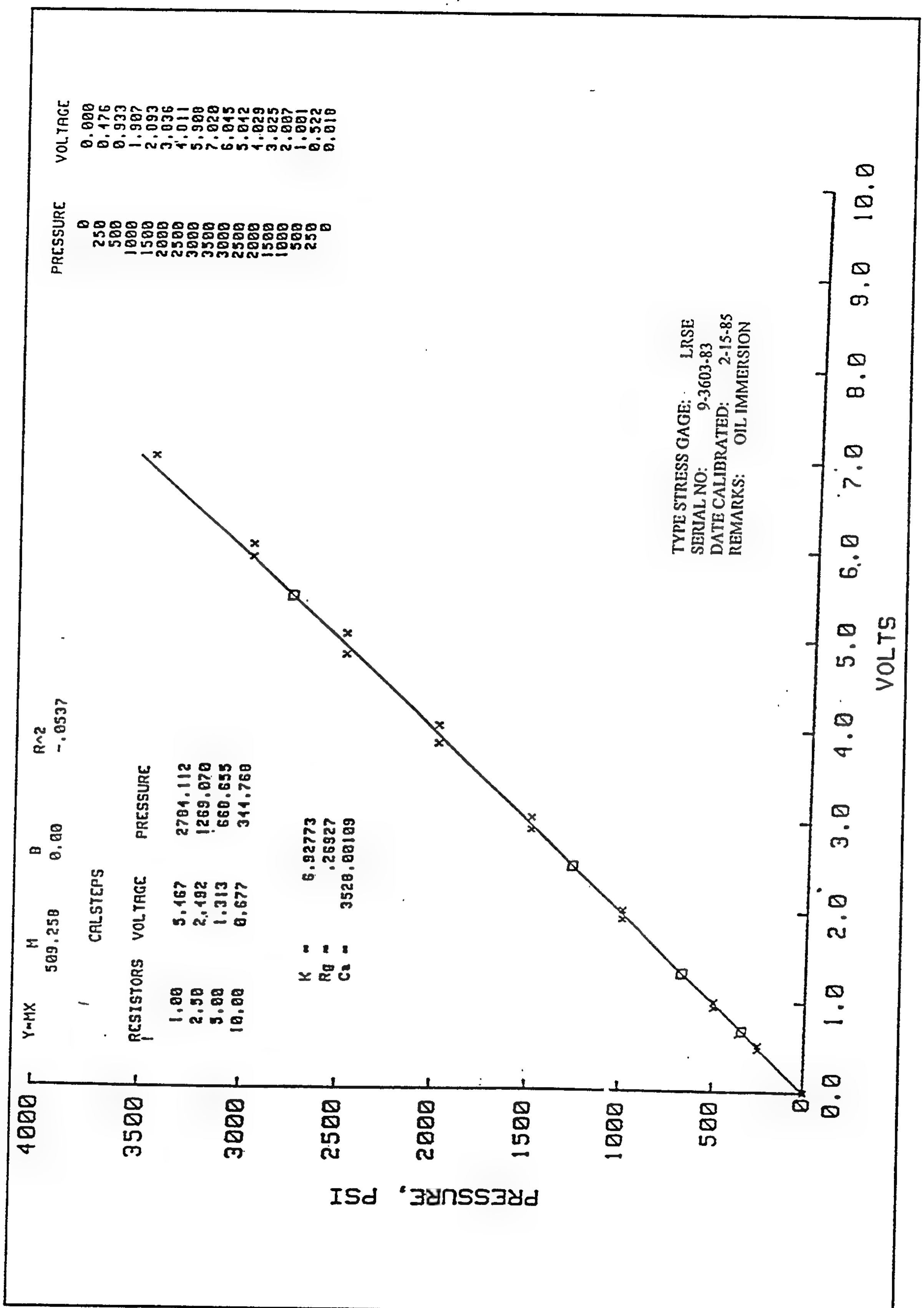

Y=MX M B R^2
509.258 0.00 -.0537
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.467 2784.112
2.50 2.492 1269.070
5.00 1.313 660.655
10.00 0.677 344.760
K = 6.92773
Rg = .26927
Ca = 3520.00109
PRESSURE VOLTAGE
0 0.000
250 0.476
500 0.933
1000 1.987
1500 2.093
2000 3.036
2500 4.011
3000 5.900
3500 7.020
3000 6.045
2500 5.012
2000 4.029
1500 3.025
1000 2.007
500 1.001
250 0.522
0 0.010
TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3603-83
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
VOLTS
0 500 1000 1500 2000 2500 3000 3500 4000
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0

Plate 6

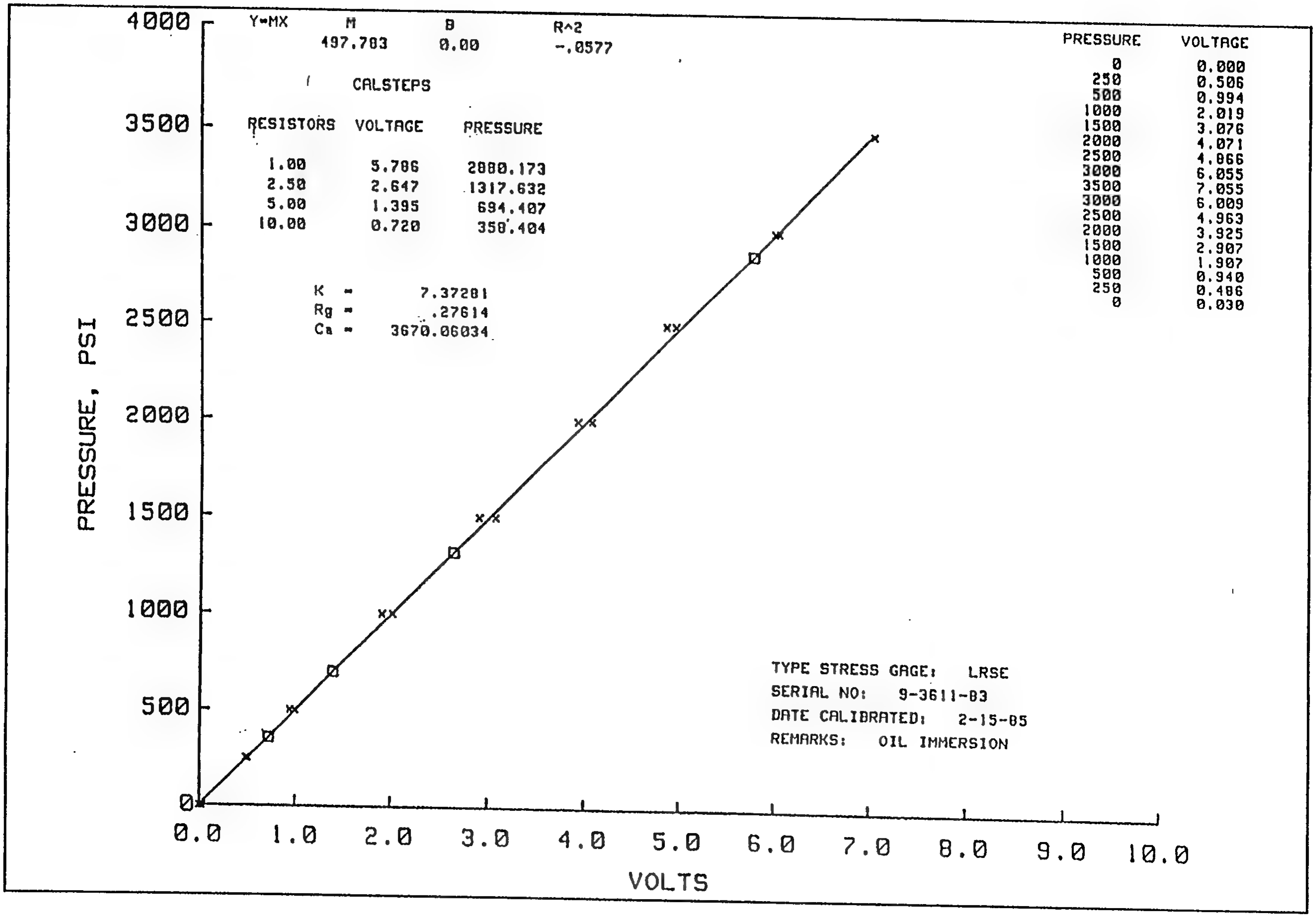

Y=MX M B R^2
497.783 0.00 -.0577
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.786 2880.173
2.50 2.647 1317.632
5.00 1.395 694.407
10.00 0.720 358.404
K = 7.37281
Rg = .27614
Ca = 3670.06034
PRESSURE VOLTAGE
0 0.000
250 0.506
500 0.994
1000 2.019
1500 3.076
2000 4.071
2500 4.866
3000 6.055
3500 7.055
3000 6.009
2500 4.963
2000 3.925
1500 2.907
1000 1.907
500 0.940
250 0.486
0 0.030
TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3611-83
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
4000
3500
3000
2500
2000
1500
1000
500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 7

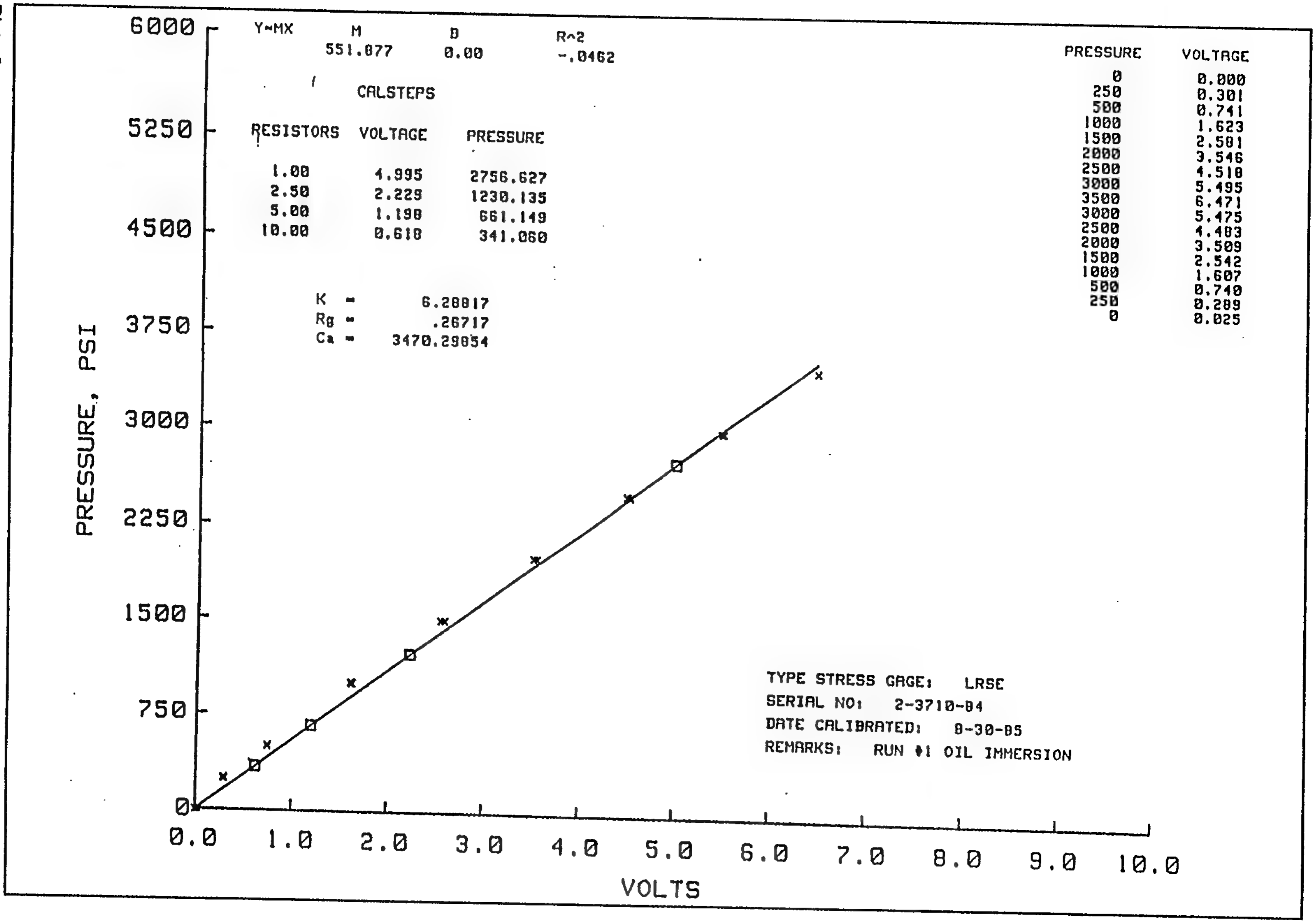
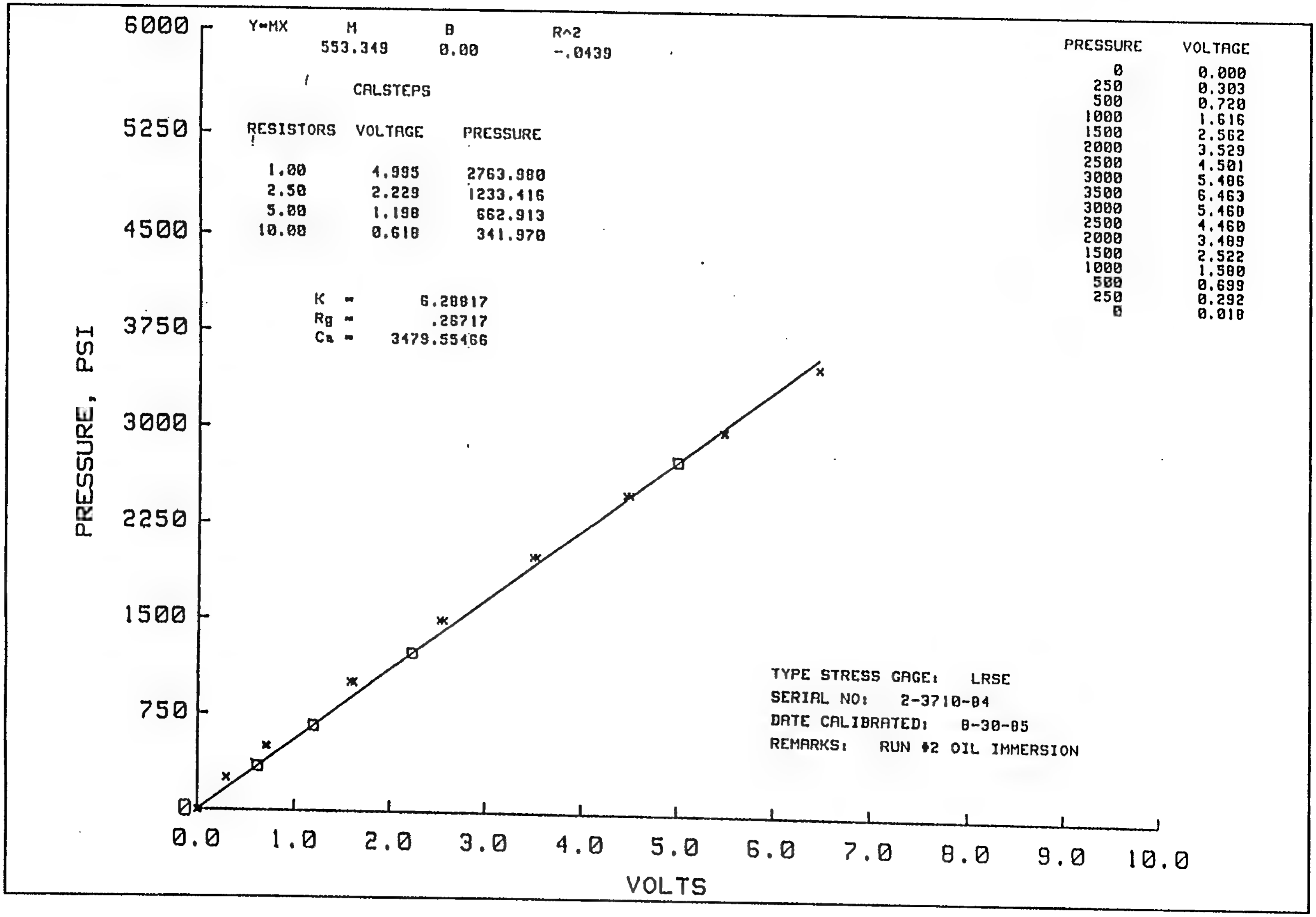

Y=MX
M
551.877
B
0.00
R^2
-.0462
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.995 2756.627
2.50 2.229 1230.135
5.00 1.198 661.149
10.00 0.618 341.060
K = 6.28817
Rg = .26717
Ca = 3470.29054
PRESSURE VOLTAGE
0 0.000
250 0.301
500 0.741
1000 1.623
1500 2.581
2000 3.546
2500 4.518
3000 5.495
3500 6.471
3000 5.475
2500 4.483
2000 3.509
1500 2.542
1000 1.607
500 0.740
250 0.289
0 0.025
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #1 OIL IMMERSION
PRESSURE, PSI
6000
5250
4500
3750
3000
2250
1500
750
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 8



Y=MX
M
553.349
B
0.00
R^2
-.0439
CALSTEPS
RESISTORS
VOLTAGE
PRESSURE
1.00 4.995 2763.980
2.50 2.229 1233.416
5.00 1.198 662.913
10.00 0.618 341.970
K = 6.28817
Rg = .26717
Ca = 3479.55466
PRESSURE
VOLTAGE
0 0.000
250 0.303
500 0.720
1000 1.616
1500 2.562
2000 3.529
2500 4.501
3000 5.406
3500 6.463
3000 5.460
2500 4.460
2000 3.489
1500 2.522
1000 1.580
500 0.699
250 0.292
0 0.018
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-04
DATE CALIBRATED: 8-30-85
REMARKS: RUN #2 OIL IMMERSION
PRESSURE, PSI
6000
5250
4500
3750
3000
2250
1500
750
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 9

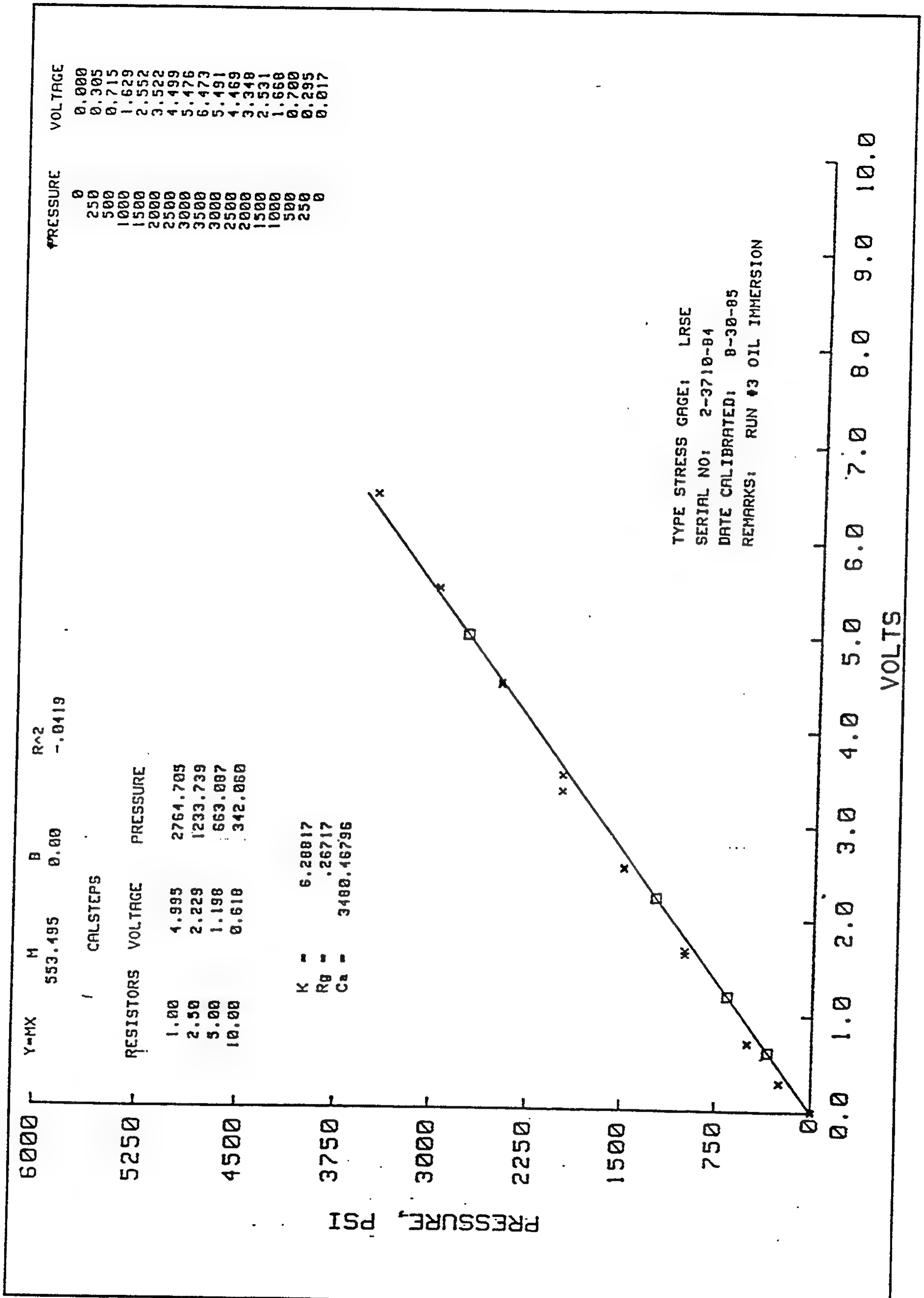

Y=MX M B R^2
553.495 0.00 -.0419
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.995 2764.705
2.50 2.229 1233.739
5.00 1.198 663.087
10.00 0.618 342.060
K = 6.28817
Rg = .26717
Ca = 3480.46796
PRESSURE VOLTAGE
0 0.000
250 0.305
500 0.715
1000 1.629
1500 2.552
2000 3.522
2500 4.499
3000 5.476
3500 6.473
3000 5.491
2500 4.469
2000 3.348
1500 2.531
1000 1.660
500 0.700
250 0.295
0 0.017
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #3 OIL IMMERSION
PRESSURE, PSI
0 750 1500 2250 3000 3750 4500 5250 6000
VOLTS
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0

Plate 10

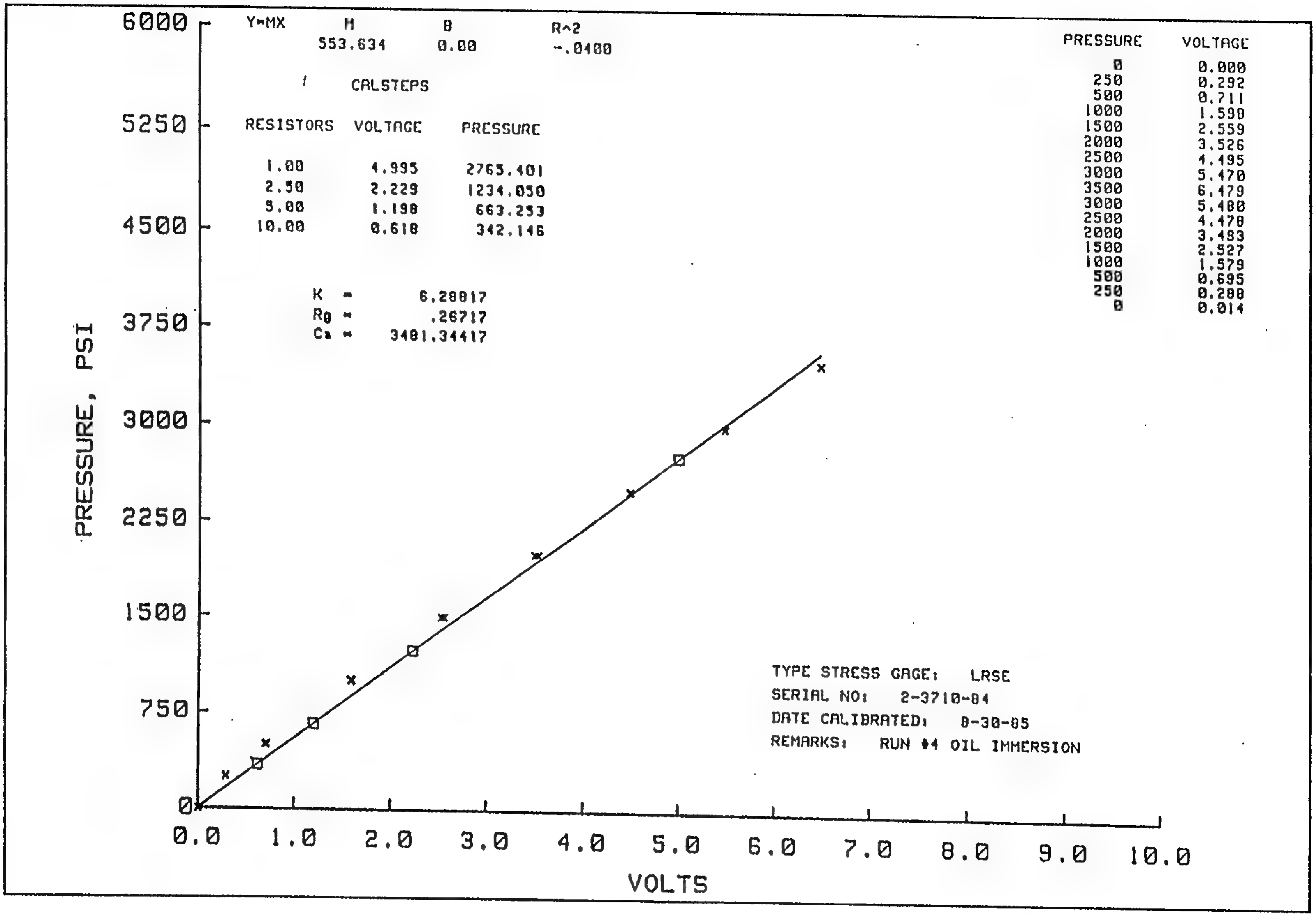
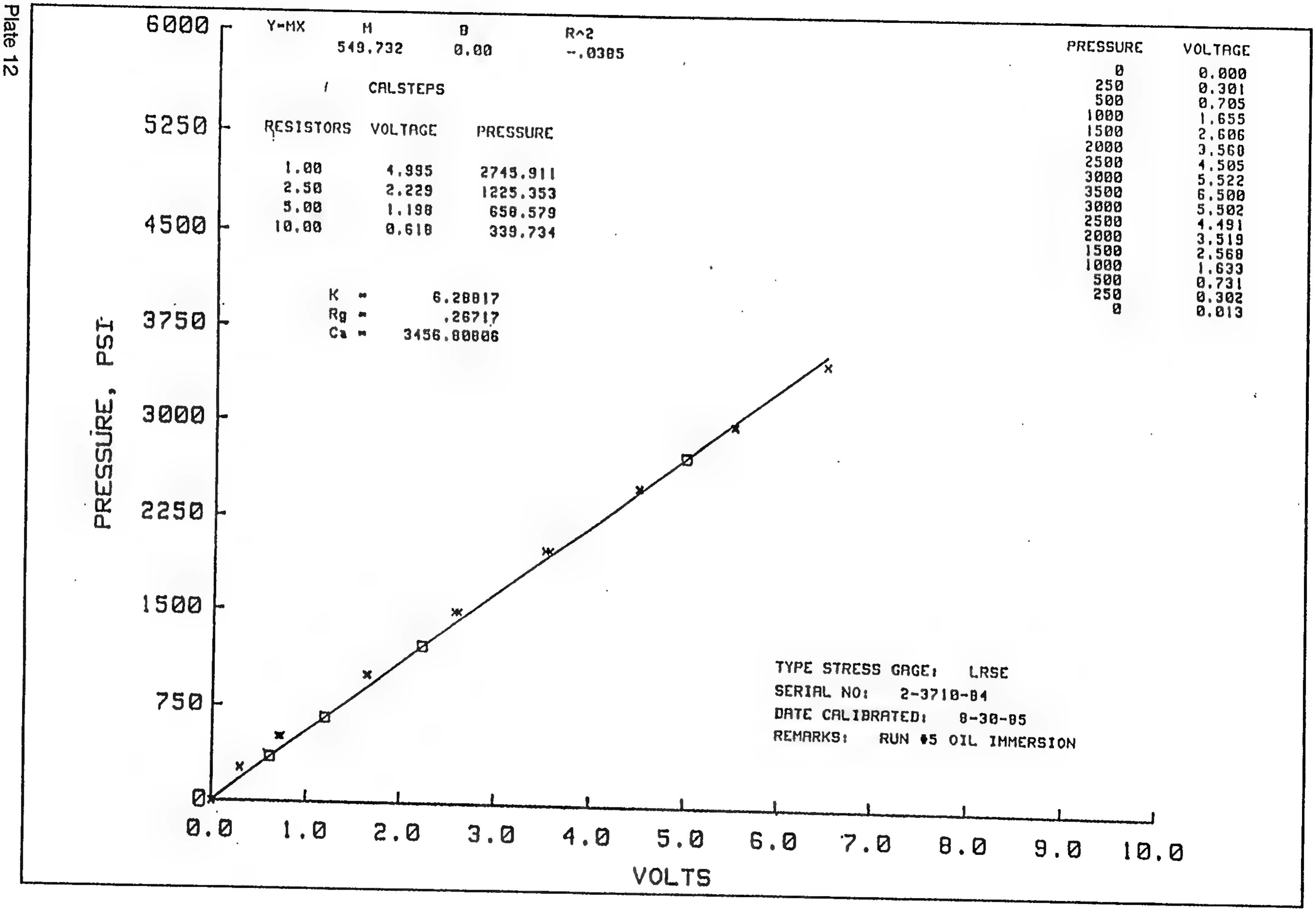
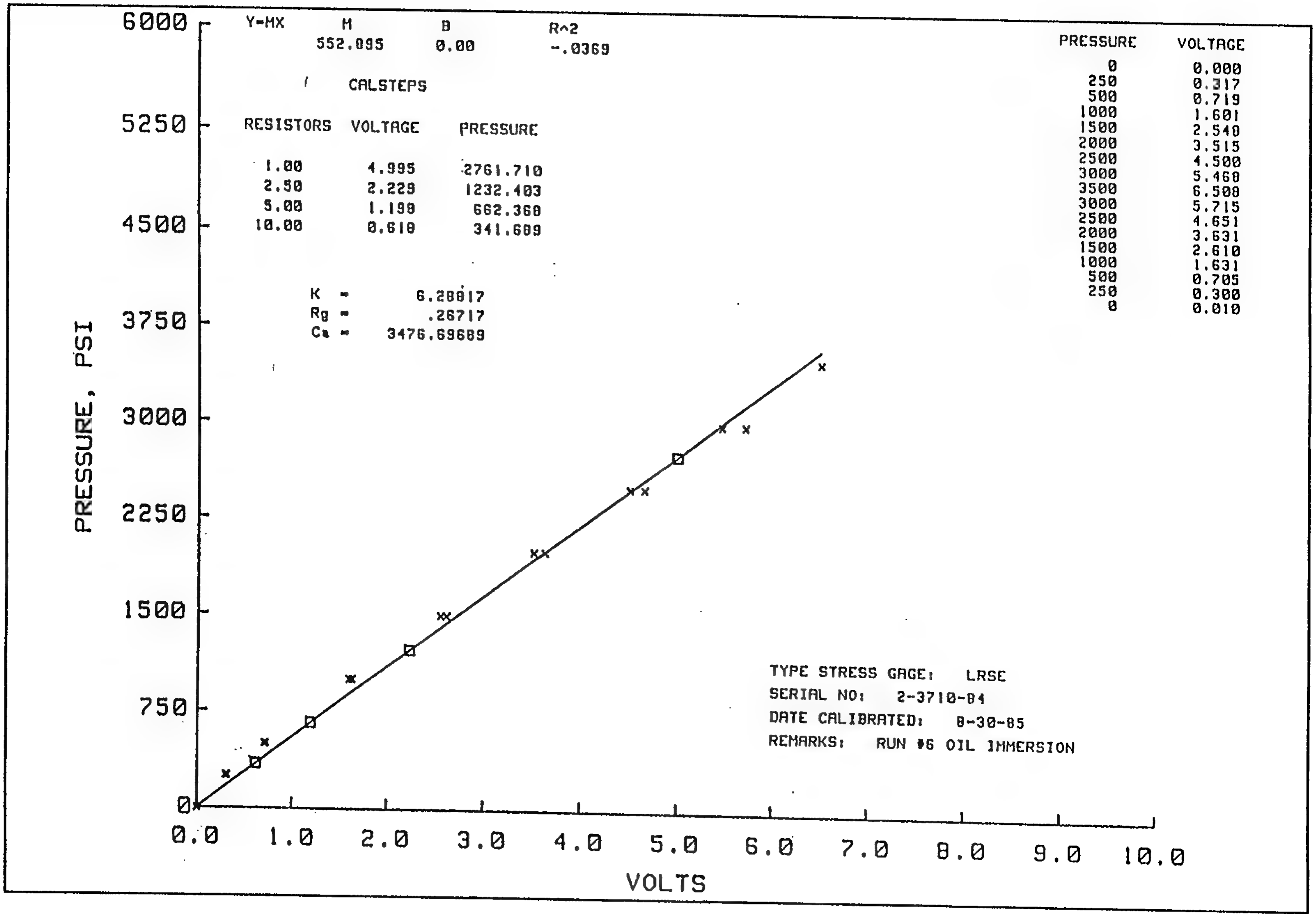

Y=MX M 553.634 B 0.00 R^2 -.0400
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.995 2765.401
2.50 2.229 1234.050
5.00 1.198 663.253
10.00 0.618 342.146
K = 6.28817
Rg = .26717
Ca = 3481.34417
PRESSURE VOLTAGE
0 0.000
250 0.292
500 0.711
1000 1.590
1500 2.559
2000 3.526
2500 4.495
3000 5.470
3500 6.479
3000 5.480
2500 4.470
2000 3.493
1500 2.527
1000 1.579
500 0.695
250 0.288
0 0.014
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #4 OIL IMMERSION
PRESSURE, PSI
6000
5250
4500
3750
3000
2250
1500
750
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 11



Y=MX
M
549.732
B
0.00
R^2
-.0385
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.995 2745.911
2.50 2.229 1225.353
5.00 1.198 658.579
10.00 0.618 339.734
K = 6.28817
Rg = .26717
Ca = 3456.80806
PRESSURE VOLTAGE
0 0.000
250 0.301
500 0.705
1000 1.655
1500 2.606
2000 3.560
2500 4.505
3000 5.522
3500 6.500
3000 5.502
2500 4.491
2000 3.519
1500 2.568
1000 1.633
500 0.731
250 0.302
0 0.013
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3718-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #5 OIL IMMERSION
PRESSURE, PSI
6000
5250
4500
3750
3000
2250
1500
750
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 12



Y=MX	M	B	R^2
	552.095	0.00	-.0369

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.995	2761.710
2.50	2.229	1232.403
5.00	1.198	662.368
10.00	0.618	341.689

K = 6.28817
Rg = .26717
Ca = 3476.69689

PRESSURE	VOLTAGE
0	0.000
250	0.317
500	0.719
1000	1.601
1500	2.540
2000	3.515
2500	4.500
3000	5.460
3500	6.500
3000	5.715
2500	4.651
2000	3.631
1500	2.610
1000	1.631
500	0.705
250	0.300
0	0.010

Plate 13

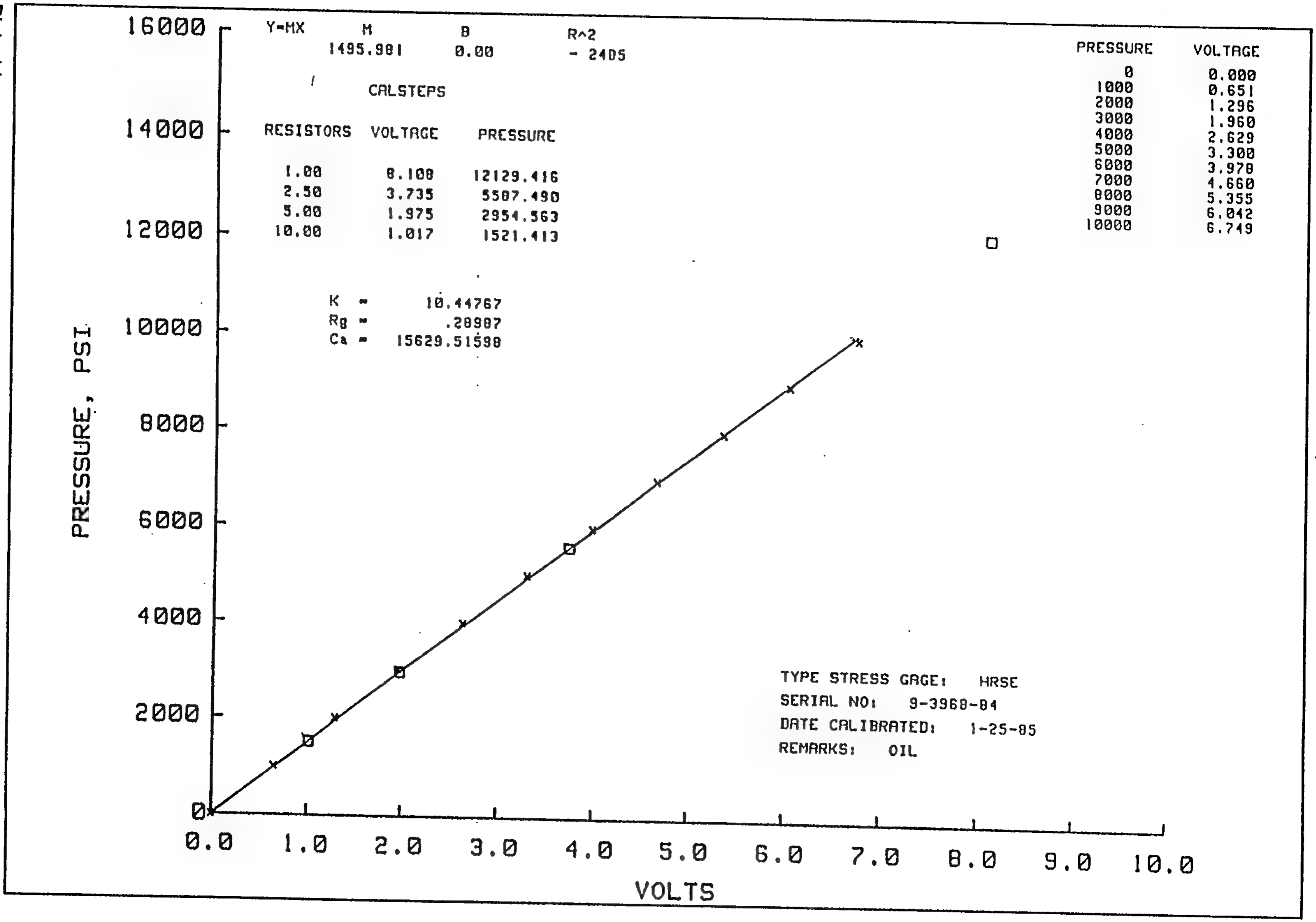
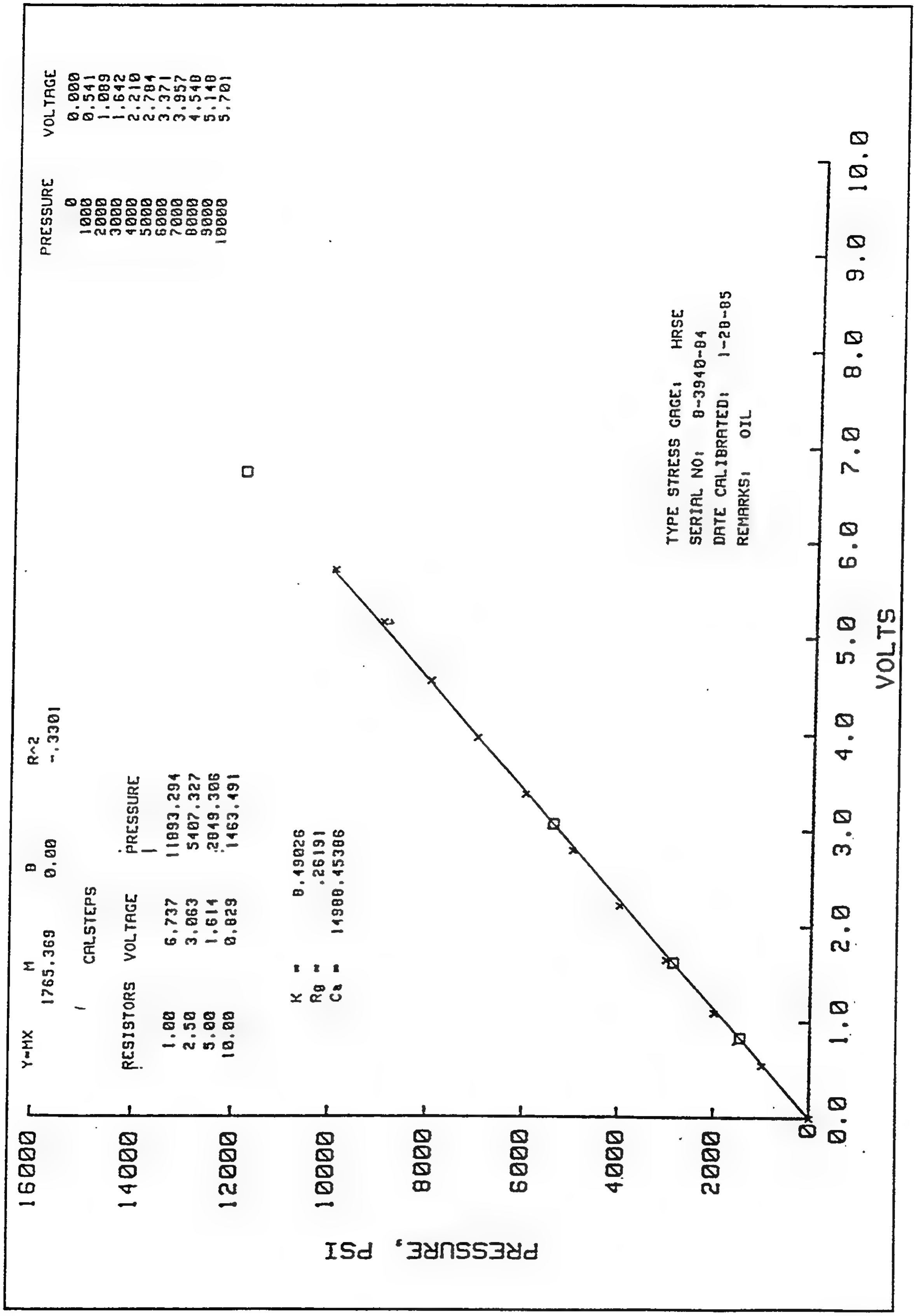

Y=MX M B R^2
1495.981 0.00 - 2405
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 8.108 12129.416
2.50 3.735 5587.490
5.00 1.975 2954.563
10.00 1.017 1521.413
K = 10.44767
Rg = .28987
Ca = 15629.51598
PRESSURE VOLTAGE
0 0.000
1000 0.651
2000 1.296
3000 1.960
4000 2.629
5000 3.300
6000 3.978
7000 4.660
8000 5.355
9000 6.042
10000 6.749
TYPE STRESS GAGE: HRSE
SERIAL NO: 9-3968-84
DATE CALIBRATED: 1-25-85
REMARKS: OIL
PRESSURE, PSI
VOLTS
0
2000
4000
6000
8000
10000
12000
14000
16000
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

Plate 14



Y=MX
M
1765.369
B
0.00
R^2
-.3301
CALSTEPS
RESISTORS
VOLTAGE
PRESSURE
1.00
6.737
11893.294
2.50
3.063
5407.327
5.00
1.614
2849.306
10.00
0.829
1463.491
K = 0.49026
Rg = .26191
Ca = 14980.45386
PRESSURE
VOLTAGE
0
0.000
1000
0.541
2000
1.089
3000
1.642
4000
2.210
5000
2.784
6000
3.371
7000
3.957
8000
4.540
9000
5.140
10000
5.701
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 1-28-85
REMARKS: OIL
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 15

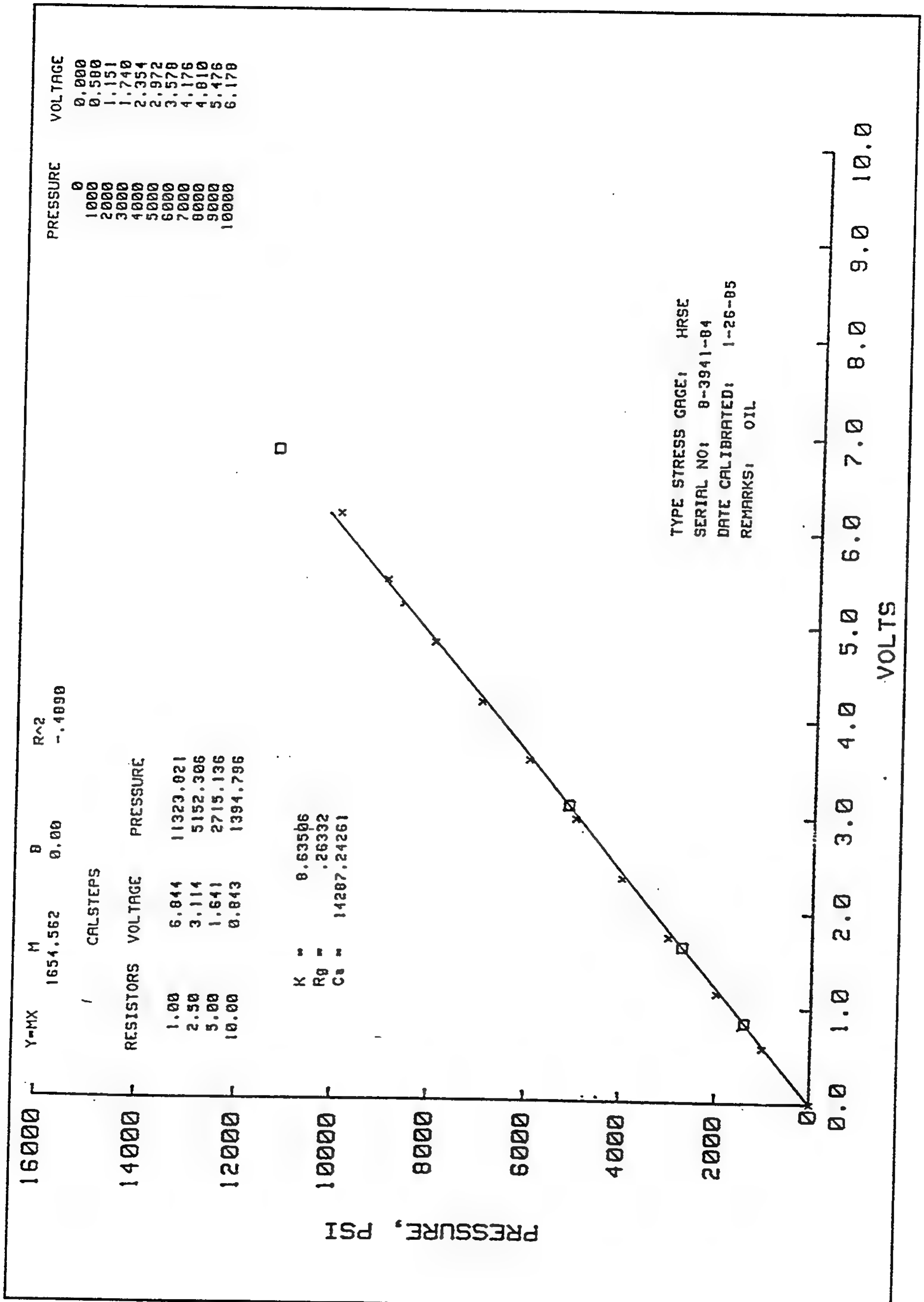
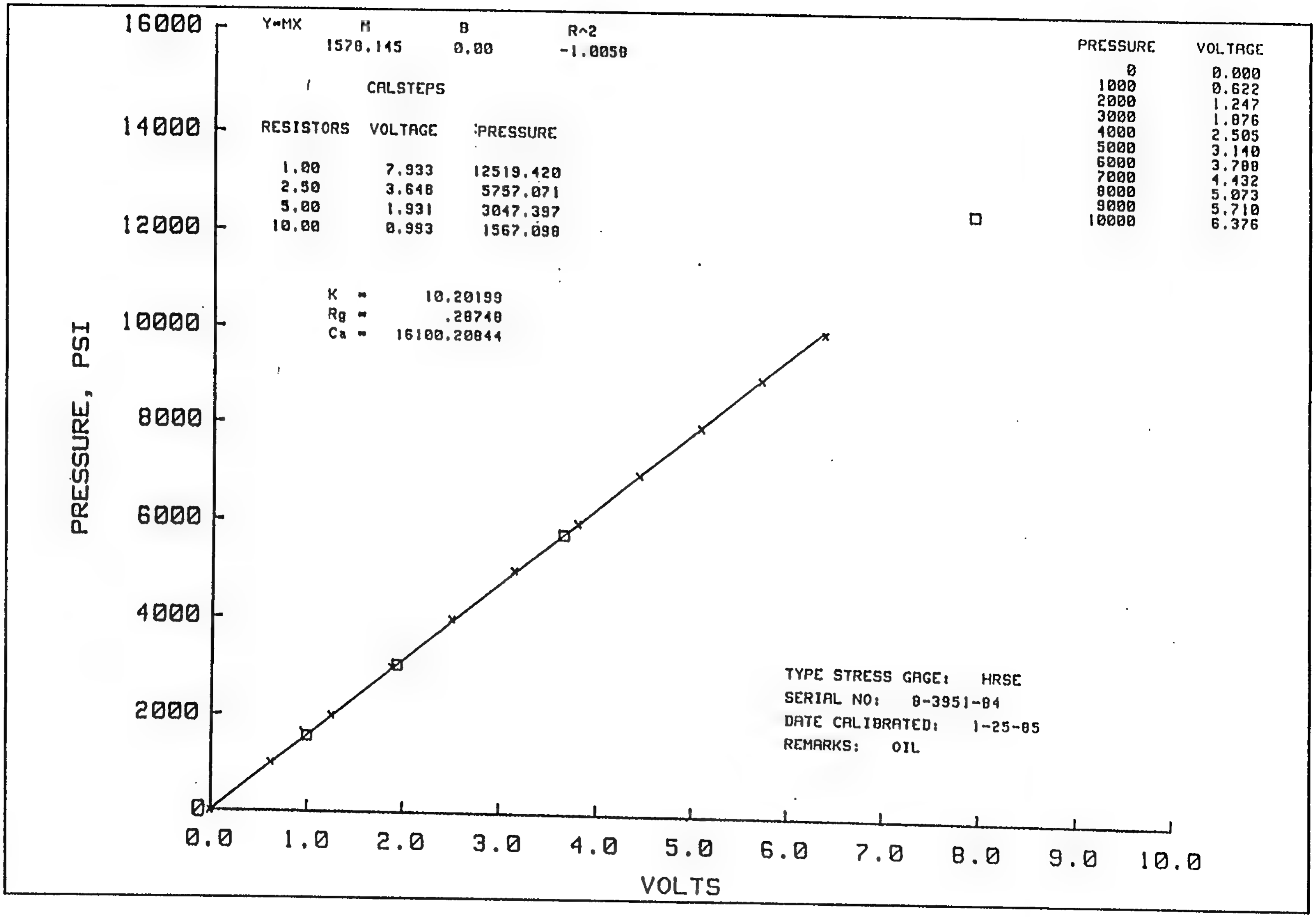

Y=MX
M
1654.562
B
0.00
R^2
-.4090
CALSTEPS
RESISTORS
VOLTAGE
PRESSURE
1.00
6.844
11323.021
2.50
3.114
5152.306
5.00
1.641
2715.136
10.00
0.843
1394.796
K = 0.63506
Rg = .26332
Ca = 14287.24261
PRESSURE
VOLTAGE
0
0.000
1000
0.580
2000
1.151
3000
1.740
4000
2.354
5000
2.972
6000
3.570
7000
4.176
8000
4.810
9000
5.476
10000
6.170
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3941-84
DATE CALIBRATED: 1-26-85
REMARKS: OIL
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
VOLTS
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

Plate 16



Y=MX
M
1578.145
B
0.00
R^2
-1.0058
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.933 12519.420
2.50 3.648 5757.071
5.00 1.931 3047.397
10.00 0.993 1567.098
K = 10.20199
Rg = .28748
Ca = 16100.20844
PRESSURE VOLTAGE
0 0.000
1000 0.622
2000 1.247
3000 1.876
4000 2.505
5000 3.140
6000 3.700
7000 4.432
8000 5.073
9000 5.710
10000 6.376
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3951-84
DATE CALIBRATED: 1-25-85
REMARKS: OIL
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 17

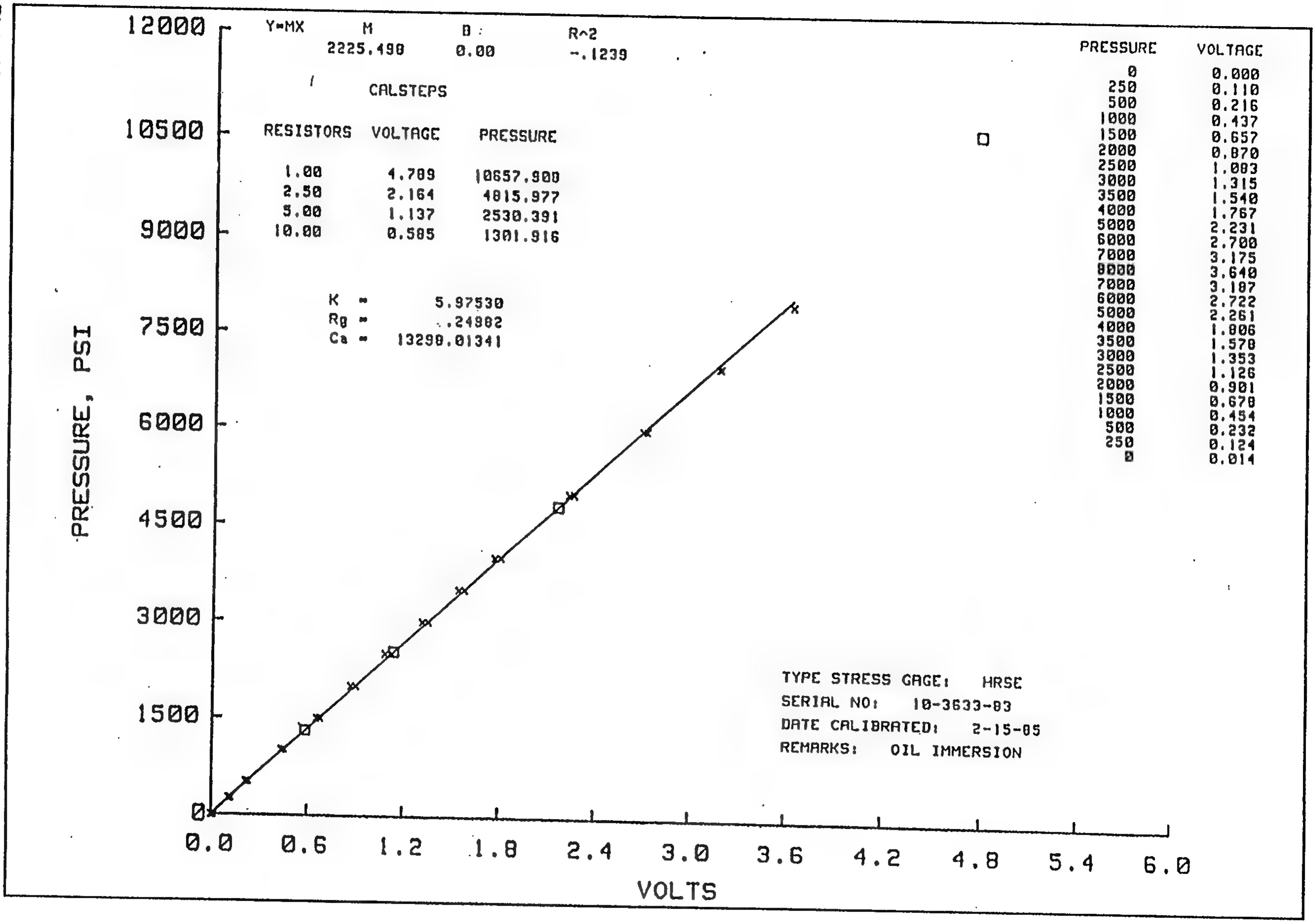

Y=MX
M
2225.498
B
0.00
R^2
-.1239
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.789 10657.900
2.50 2.164 4815.977
5.00 1.137 2530.391
10.00 0.585 1301.916
K = 5.97530
Rg = .24982
Ca = 13290.01341
PRESSURE VOLTAGE
0 0.000
250 0.110
500 0.216
1000 0.437
1500 0.657
2000 0.870
2500 1.083
3000 1.315
3500 1.540
4000 1.767
5000 2.231
6000 2.700
7000 3.175
8000 3.640
7000 3.187
6000 2.722
5000 2.261
4000 1.806
3500 1.578
3000 1.353
2500 1.126
2000 0.901
1500 0.678
1000 0.454
500 0.232
250 0.124
0 0.014
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3633-83
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
0.6
1.2
1.8
2.4
3.0
3.6
4.2
4.8
5.4
6.0
VOLTS

Plate 18

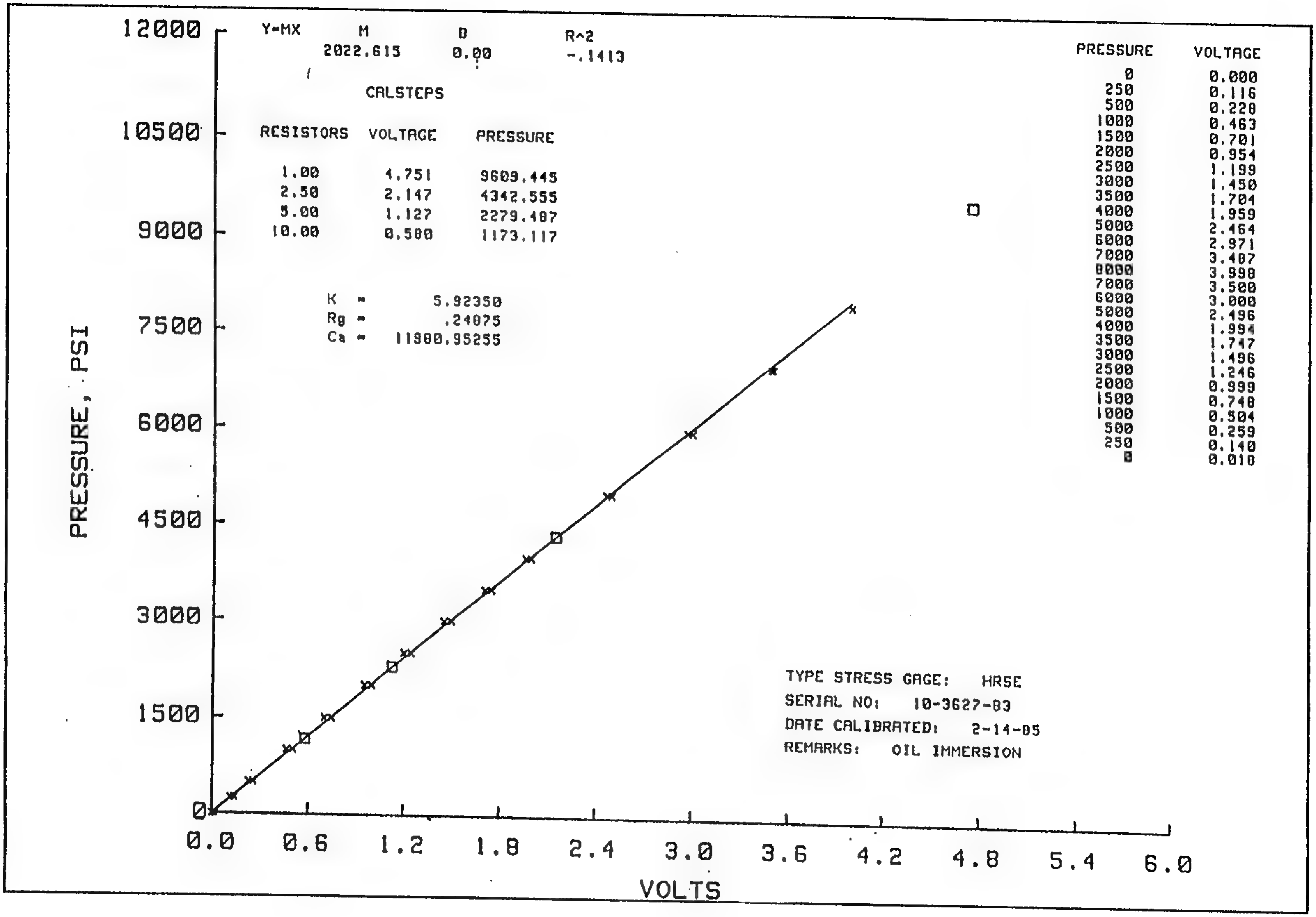

Y=MX M B R^2
2022.615 0.00 -.1413
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.751 9609.445
2.50 2.147 4342.555
5.00 1.127 2279.487
10.00 0.580 1173.117
K = 5.92350
Rg = .24875
Ca = 11980.95255
PRESSURE VOLTAGE
0 0.000
250 0.116
500 0.220
1000 0.463
1500 0.701
2000 0.954
2500 1.199
3000 1.450
3500 1.704
4000 1.959
5000 2.464
6000 2.971
7000 3.487
8000 3.998
7000 3.500
6000 3.000
5000 2.496
4000 1.994
3500 1.747
3000 1.496
2500 1.246
2000 0.999
1500 0.748
1000 0.504
500 0.259
250 0.140
0 0.018
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3627-03
DATE CALIBRATED: 2-14-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
VOLTS
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
0.6
1.2
1.8
2.4
3.0
3.6
4.2
4.8
5.4
6.0

Plate 19

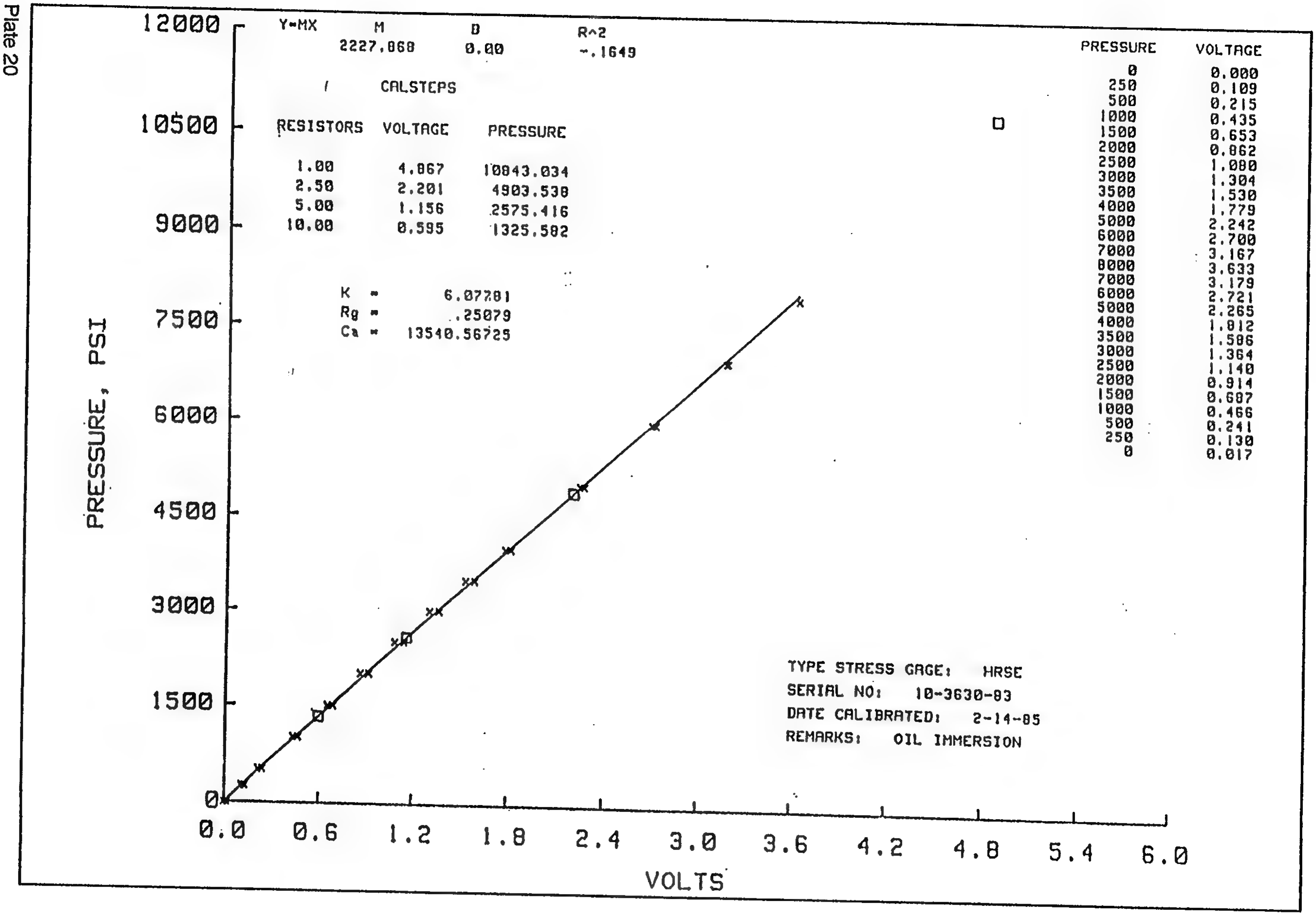

Y=MX
M 2227.868
B 0.00
R^2 -.1649
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.867 10843.034
2.50 2.201 4903.538
5.00 1.156 2575.416
10.00 0.595 1325.582
K = 6.07781
Rg = .25079
Ca = 13540.56725
PRESSURE VOLTAGE
0 0.000
250 0.109
500 0.215
1000 0.435
1500 0.653
2000 0.862
2500 1.080
3000 1.304
3500 1.530
4000 1.779
5000 2.242
6000 2.700
7000 3.167
8000 3.633
7000 3.179
6000 2.721
5000 2.265
4000 1.812
3500 1.586
3000 1.364
2500 1.140
2000 0.914
1500 0.687
1000 0.466
500 0.241
250 0.130
0 0.017
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3630-83
DATE CALIBRATED: 2-14-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
0.6
1.2
1.8
2.4
3.0
3.6
4.2
4.8
5.4
6.0
VOLTS

Plate 20

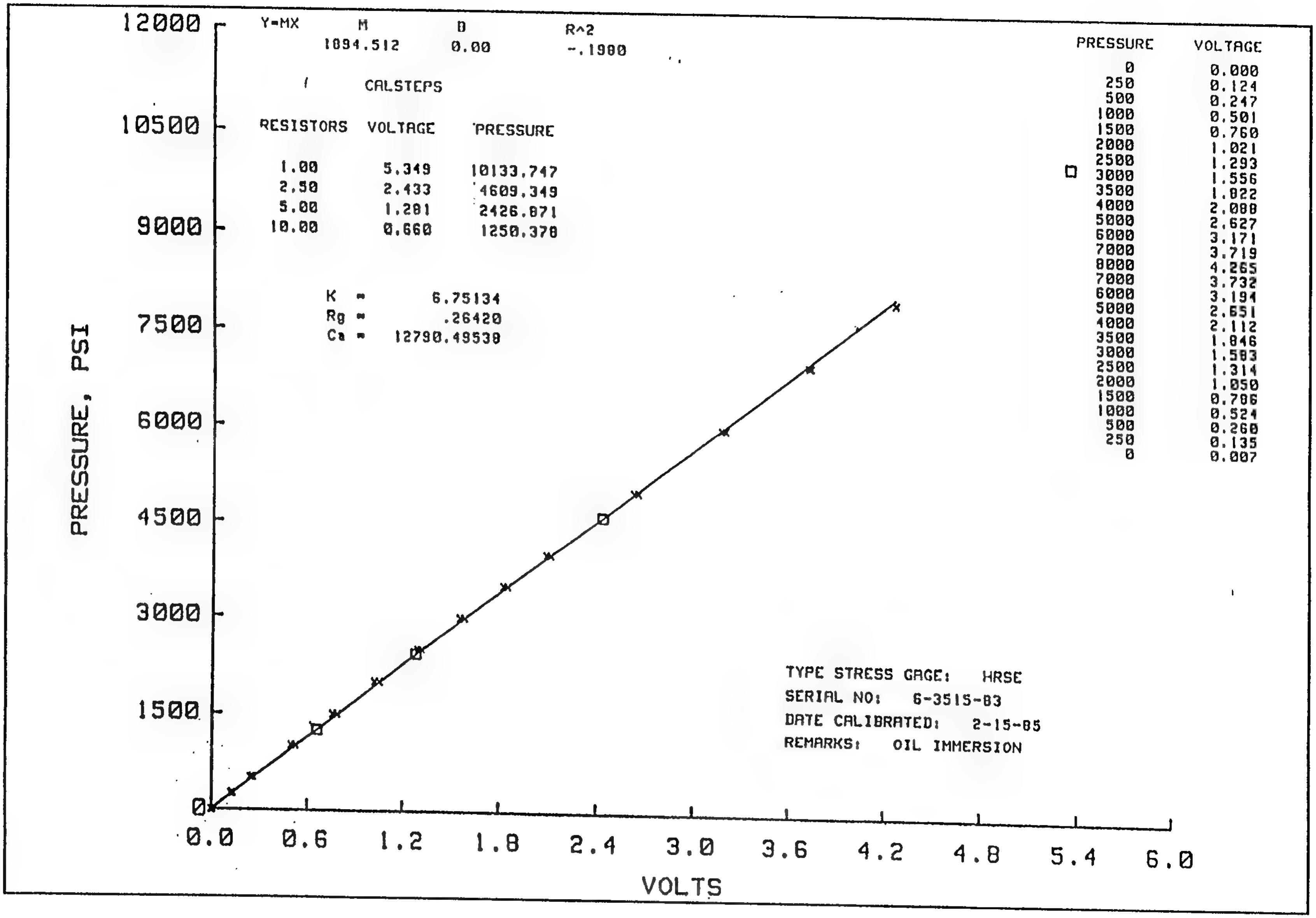
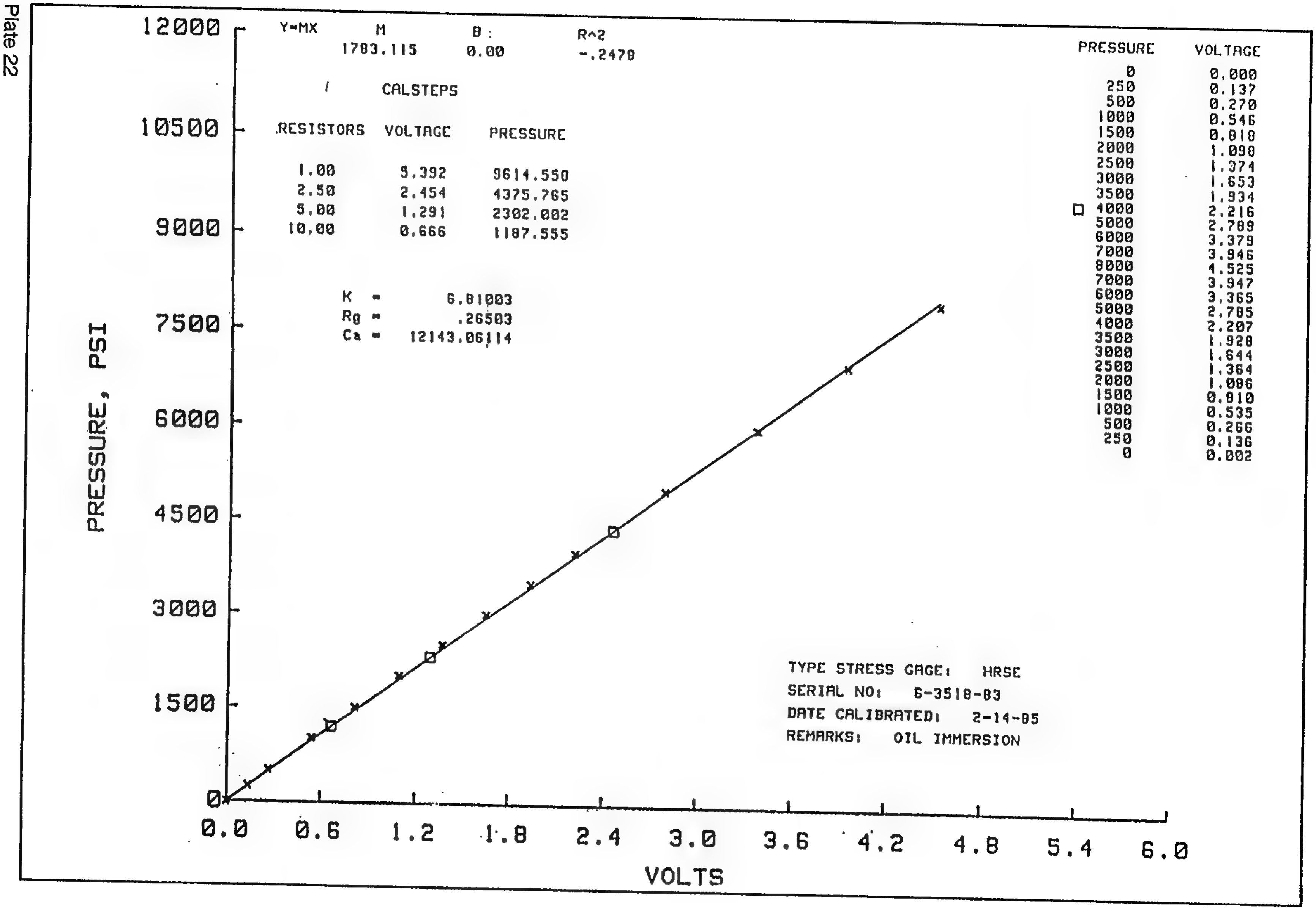

Y=MX
M
1894.512
B
0.00
R^2
-.1980
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.349 10133.747
2.50 2.433 4609.349
5.00 1.281 2426.871
10.00 0.660 1250.378
K = 6.75134
Rg = .26420
Ca = 12790.49538
PRESSURE VOLTAGE
0 0.000
250 0.124
500 0.247
1000 0.501
1500 0.760
2000 1.021
2500 1.293
3000 1.556
3500 1.822
4000 2.088
5000 2.627
6000 3.171
7000 3.719
8000 4.265
7000 3.732
6000 3.194
5000 2.651
4000 2.112
3500 1.846
3000 1.583
2500 1.314
2000 1.050
1500 0.786
1000 0.524
500 0.260
250 0.135
0 0.007
TYPE STRESS GAGE: HRSE
SERIAL NO: 6-3515-83
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
0
1500
3000
4500
6000
7500
9000
10500
12000
0.0
0.6
1.2
1.8
2.4
3.0
3.6
4.2
4.8
5.4
6.0
VOLTS

Plate 21

Plate 22


Y=MX M B : R^2
1783.115 0.00 -.2470
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.392 9614.550
2.50 2.454 4375.765
5.00 1.291 2302.002
10.00 0.666 1187.555
K = 6.81003
Rg = .26503
Ca = 12143.06114
PRESSURE VOLTAGE
0 0.000
250 0.137
500 0.270
1000 0.546
1500 0.810
2000 1.090
2500 1.374
3000 1.653
3500 1.934
4000 2.216
5000 2.789
6000 3.379
7000 3.946
8000 4.525
7000 3.947
6000 3.365
5000 2.785
4000 2.207
3500 1.928
3000 1.644
2500 1.364
2000 1.086
1500 0.810
1000 0.535
500 0.266
250 0.136
0 0.002
TYPE STRESS GAGE: HRSE
SERIAL NO: 6-3518-83
DATE CALIBRATED: 2-14-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
0.6
1.2
1.8
2.4
3.0
3.6
4.2
4.8
5.4
6.0
VOLTS

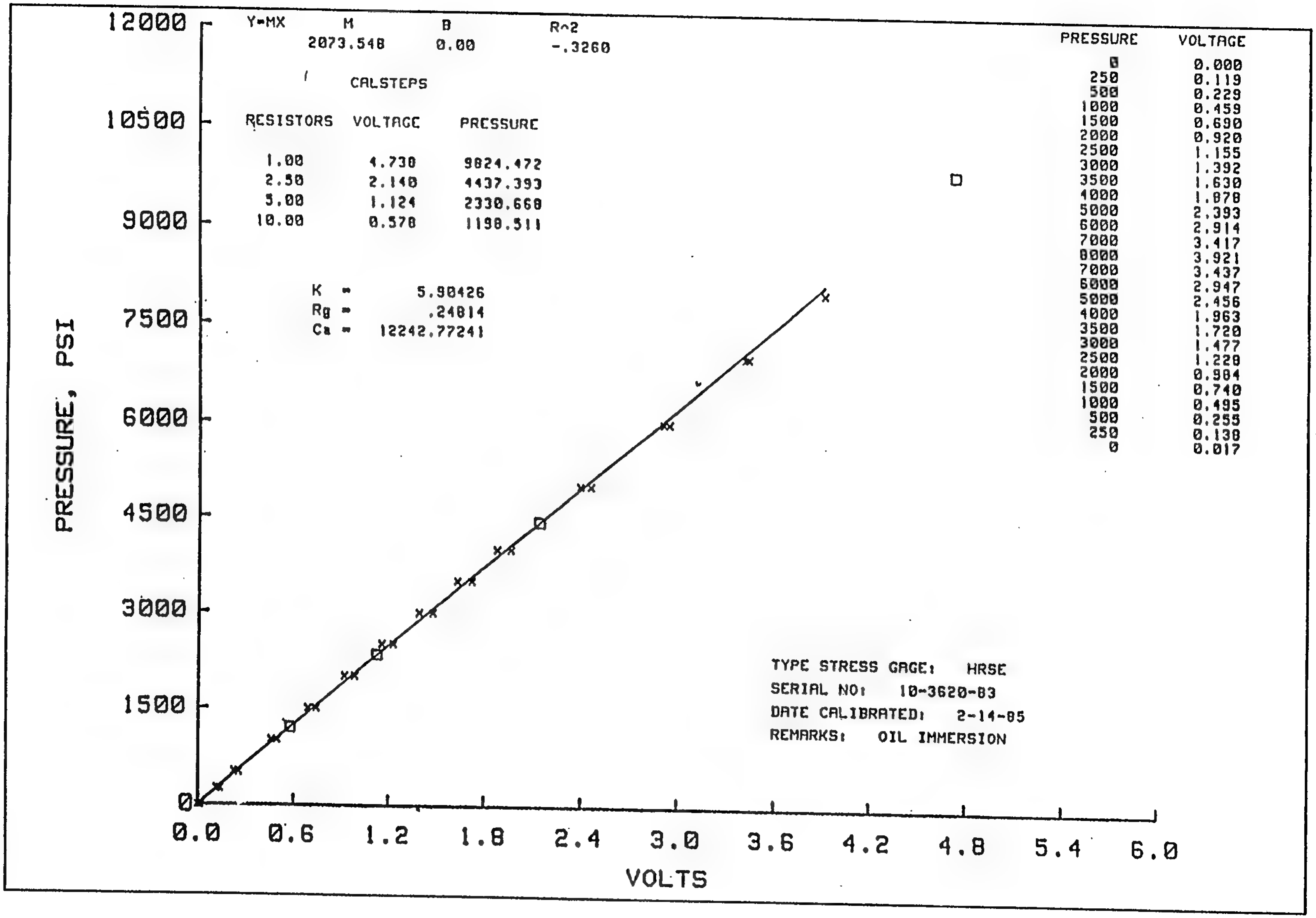

Y=MX M B R^2
2073.548 0.00 -.3260
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.730 9824.472
2.50 2.140 4437.393
5.00 1.124 2330.660
10.00 0.578 1198.511
K = 5.90426
Rg = .24814
Ca = 12242.77241
PRESSURE VOLTAGE
0 0.000
250 0.119
500 0.229
1000 0.459
1500 0.690
2000 0.920
2500 1.155
3000 1.392
3500 1.630
4000 1.878
5000 2.393
6000 2.914
7000 3.417
8000 3.921
7000 3.437
6000 2.947
5000 2.456
4000 1.963
3500 1.720
3000 1.477
2500 1.228
2000 0.984
1500 0.740
1000 0.495
500 0.255
250 0.138
0 0.017
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3620-83
DATE CALIBRATED: 2-14-85
REMARKS: OIL IMMERSION
12000
10500
9000
7500
6000
4500
3000
1500
0
PRESSURE, PSI
0.0
0.6
1.2
1.8
2.4
3.0
3.6
4.2
4.8
5.4
6.0
VOLTS

Plate 23

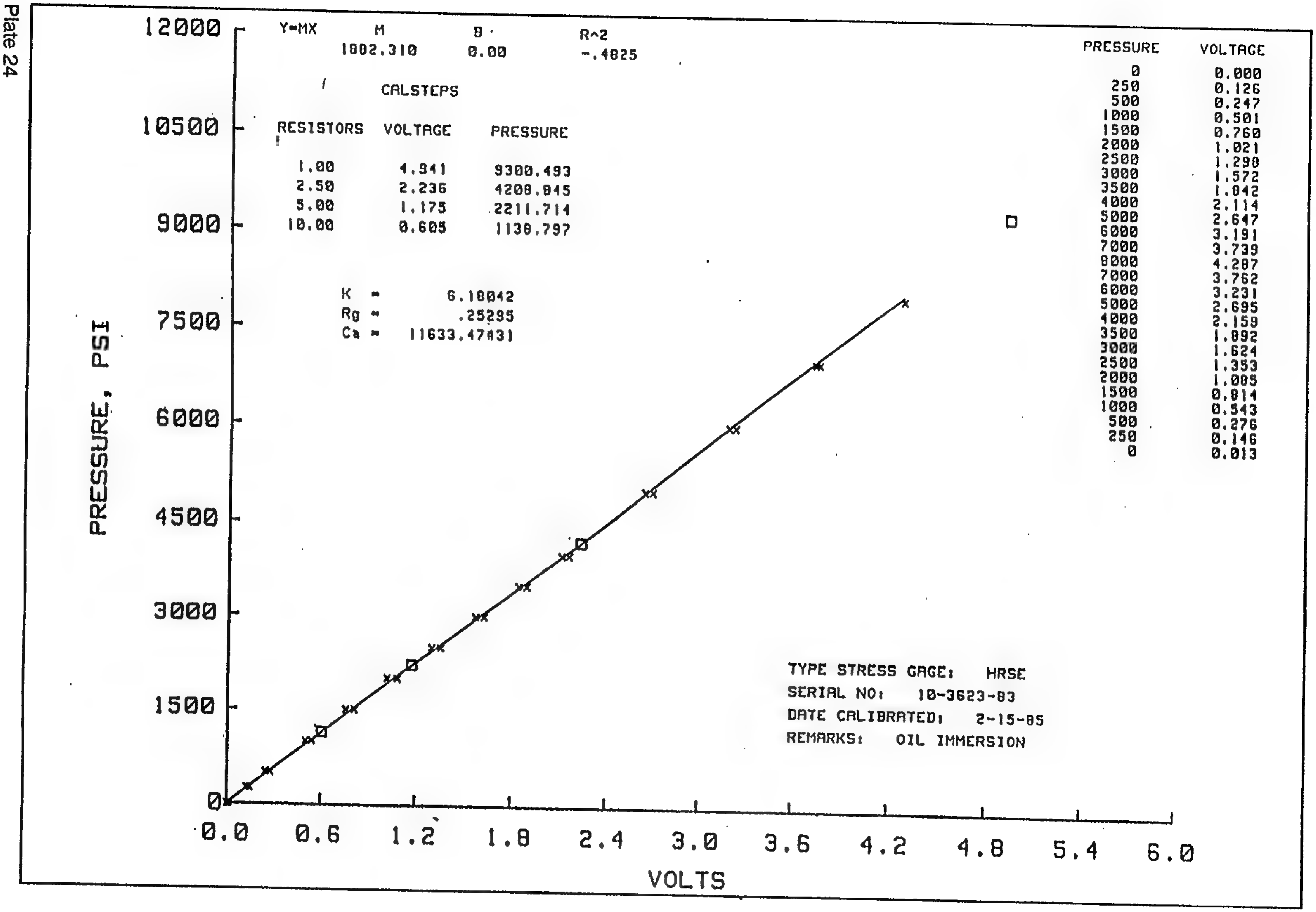

Y=MX M B R^2
1882.310 0.00 -.4825
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.941 9300.493
2.50 2.236 4208.845
5.00 1.175 2211.714
10.00 0.605 1138.797
K = 6.18042
Rg = .25295
Ca = 11633.47831
PRESSURE VOLTAGE
0 0.000
250 0.126
500 0.247
1000 0.501
1500 0.760
2000 1.021
2500 1.290
3000 1.572
3500 1.842
4000 2.114
5000 2.647
6000 3.191
7000 3.739
8000 4.287
7000 3.762
6000 3.231
5000 2.695
4000 2.159
3500 1.892
3000 1.624
2500 1.353
2000 1.085
1500 0.814
1000 0.543
500 0.276
250 0.146
0 0.013
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3623-83
DATE CALIBRATED: 2-15-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0 0.6 1.2 1.8 2.4 3.0 3.6 4.2 4.8 5.4 6.0
VOLTS

Plate 24

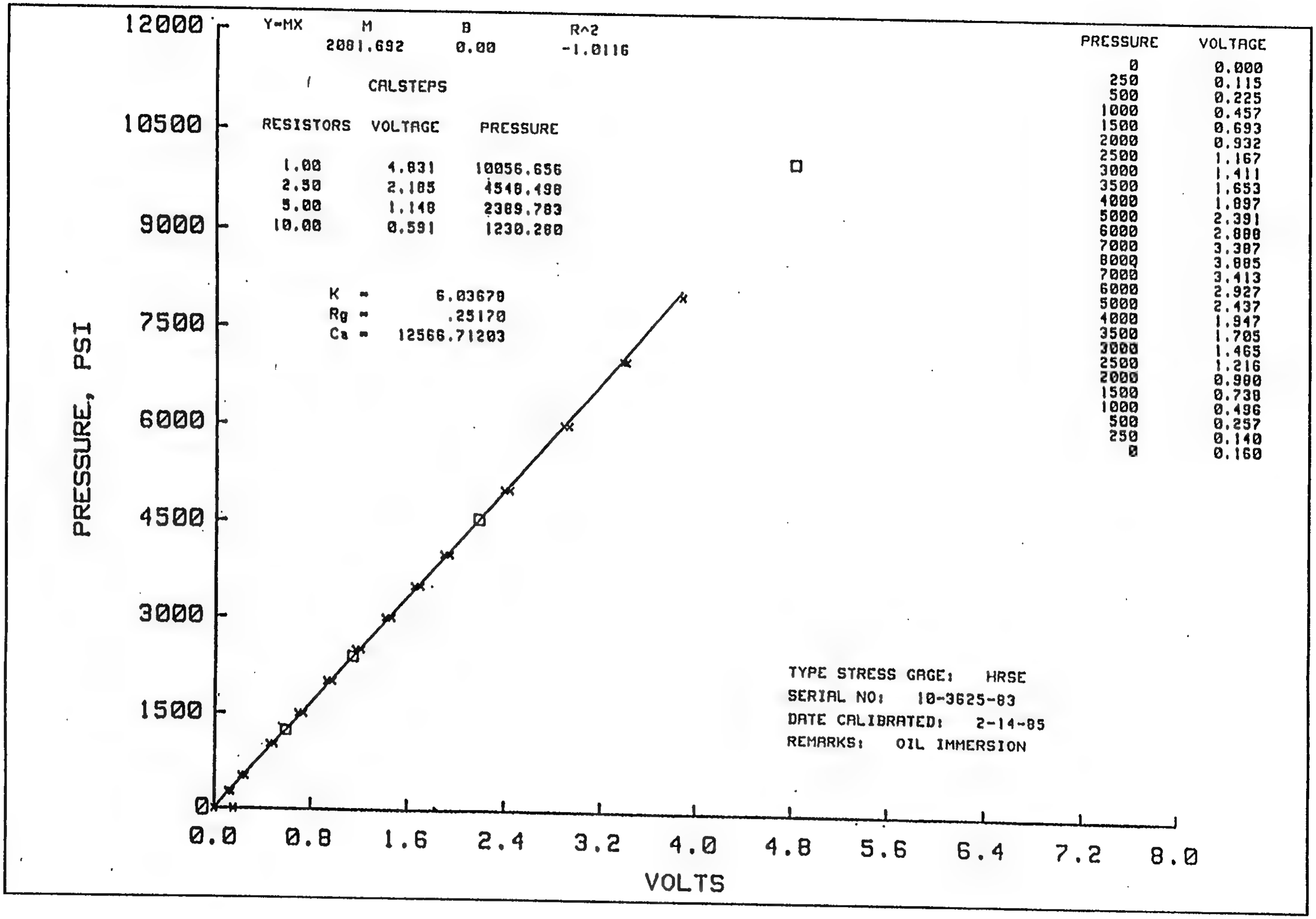

Y=MX M B R^2
2081.692 0.00 -1.0116
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.831 10056.656
2.50 2.185 4548.498
5.00 1.148 2389.783
10.00 0.591 1230.280
K = 6.03678
Rg = .25170
Ca = 12566.71203
PRESSURE VOLTAGE
0 0.000
250 0.115
500 0.225
1000 0.457
1500 0.693
2000 0.932
2500 1.167
3000 1.411
3500 1.653
4000 1.897
5000 2.391
6000 2.888
7000 3.387
8000 3.885
7000 3.413
6000 2.927
5000 2.437
4000 1.947
3500 1.705
3000 1.465
2500 1.216
2000 0.980
1500 0.738
1000 0.496
500 0.257
250 0.140
0 0.160
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3625-83
DATE CALIBRATED: 2-14-85
REMARKS: OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
0.8
1.6
2.4
3.2
4.0
4.8
5.6
6.4
7.2
8.0
VOLTS

Plate 25

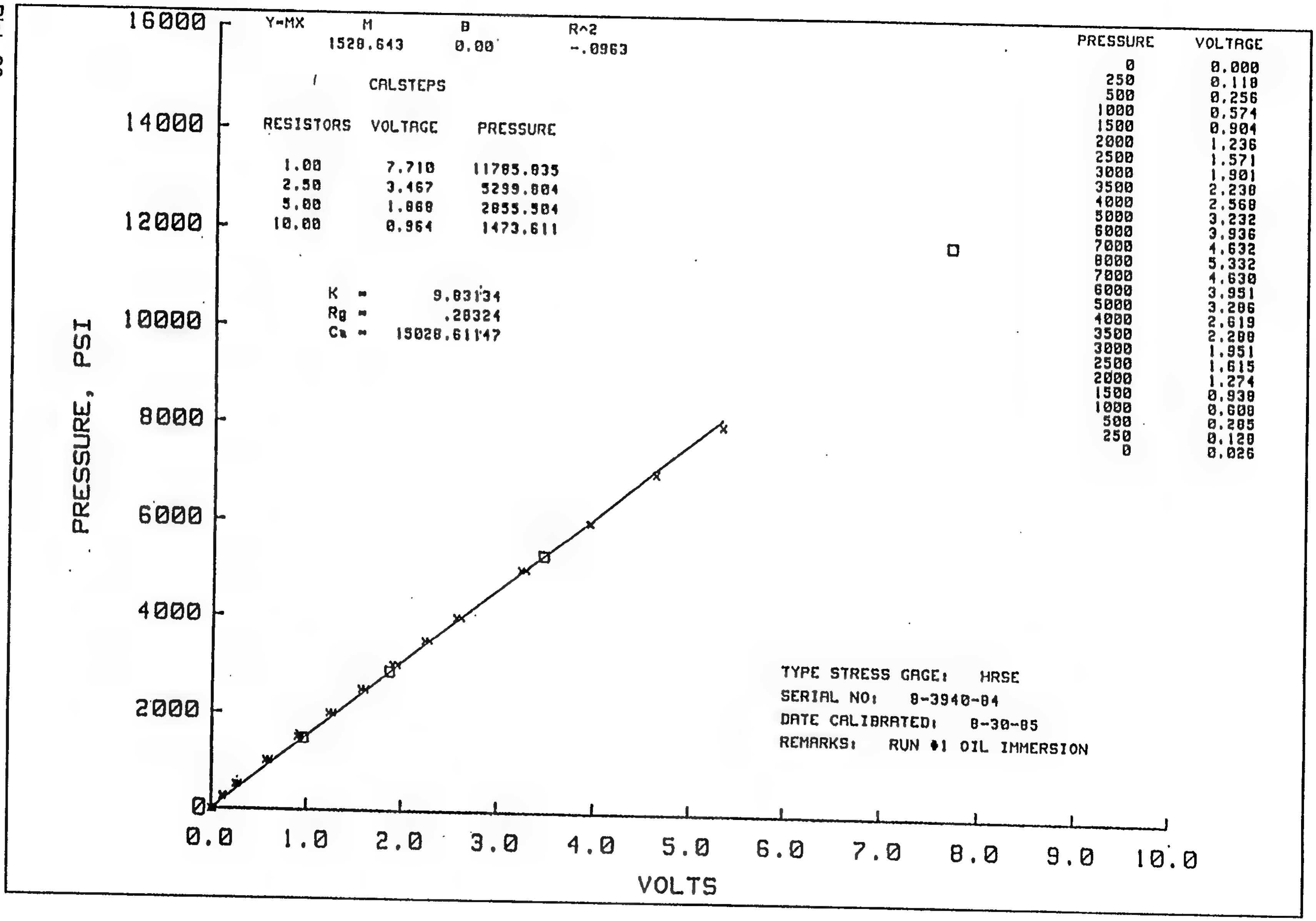

Y=MX
M
1528.643
B
0.00
R^2
-.0963
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.710 11785.835
2.50 3.467 5299.804
5.00 1.868 2855.504
10.00 0.964 1473.611
K = 9.83134
Rg = .28324
Ca = 15028.61147
PRESSURE VOLTAGE
0 0.000
250 0.118
500 0.256
1000 0.574
1500 0.904
2000 1.236
2500 1.571
3000 1.901
3500 2.230
4000 2.560
5000 3.232
6000 3.936
7000 4.632
8000 5.332
7000 4.630
6000 3.951
5000 3.286
4000 2.619
3500 2.288
3000 1.951
2500 1.615
2000 1.274
1500 0.938
1000 0.608
500 0.285
250 0.128
0 0.026
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #1 OIL IMMERSION
PRESSURE, PSI
VOLTS
0
2000
4000
6000
8000
10000
12000
14000
16000
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

Plate 26

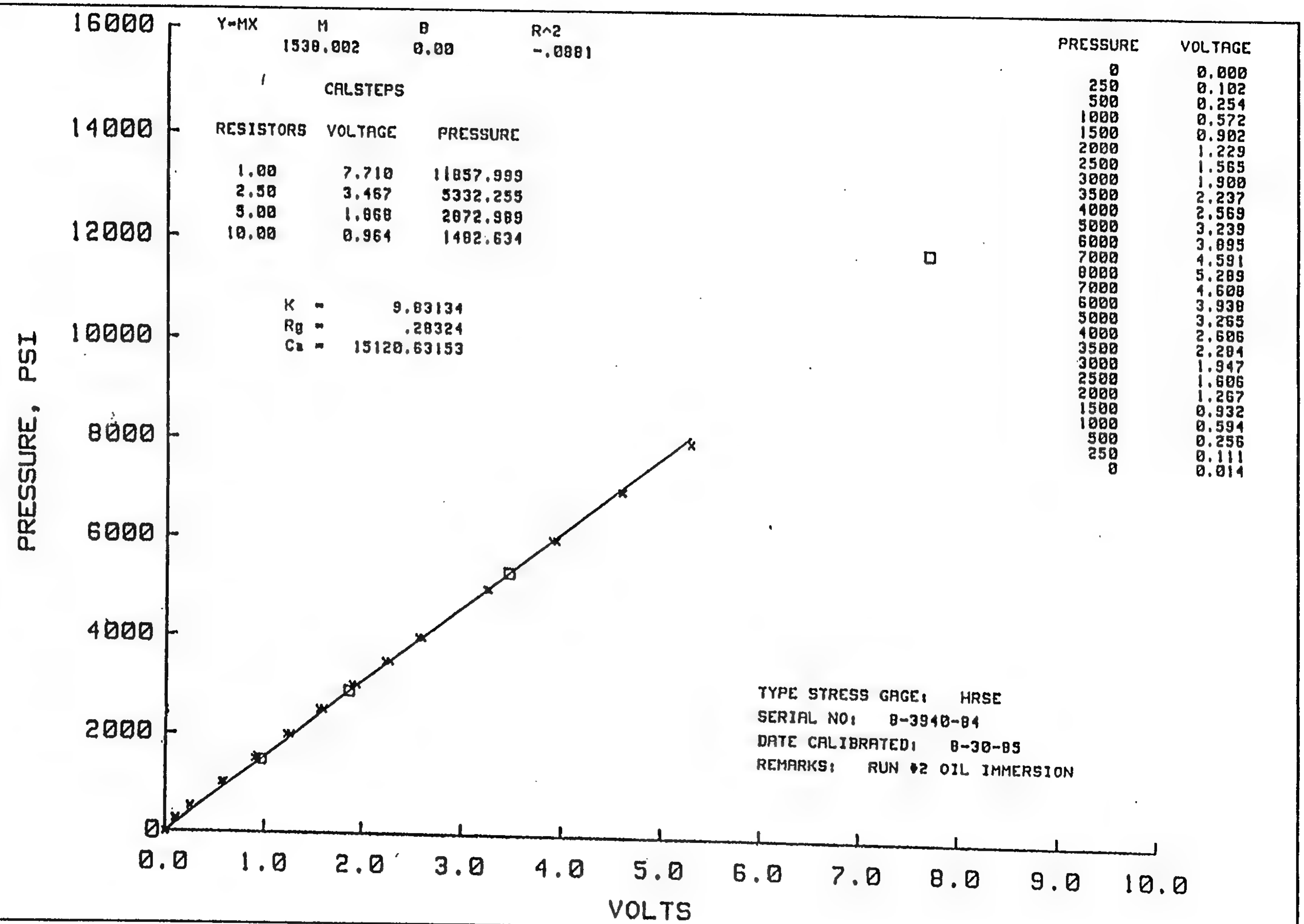

Y=MX
M 1530.002
B 0.00
R^2 -.0881
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.710 11857.999
2.50 3.467 5332.255
5.00 1.868 2872.989
10.00 0.964 1482.634
K = 9.83134
Rg = .28324
Cs = 15120.63153
PRESSURE VOLTAGE
0 0.000
250 0.102
500 0.254
1000 0.572
1500 0.902
2000 1.229
2500 1.565
3000 1.900
3500 2.237
4000 2.569
5000 3.239
6000 3.895
7000 4.591
8000 5.289
7000 4.608
6000 3.938
5000 3.265
4000 2.606
3500 2.284
3000 1.947
2500 1.606
2000 1.267
1500 0.932
1000 0.594
500 0.256
250 0.111
0 0.014
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #2 OIL IMMERSION
PRESSURE, PSI
VOLTS
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

Plate 27

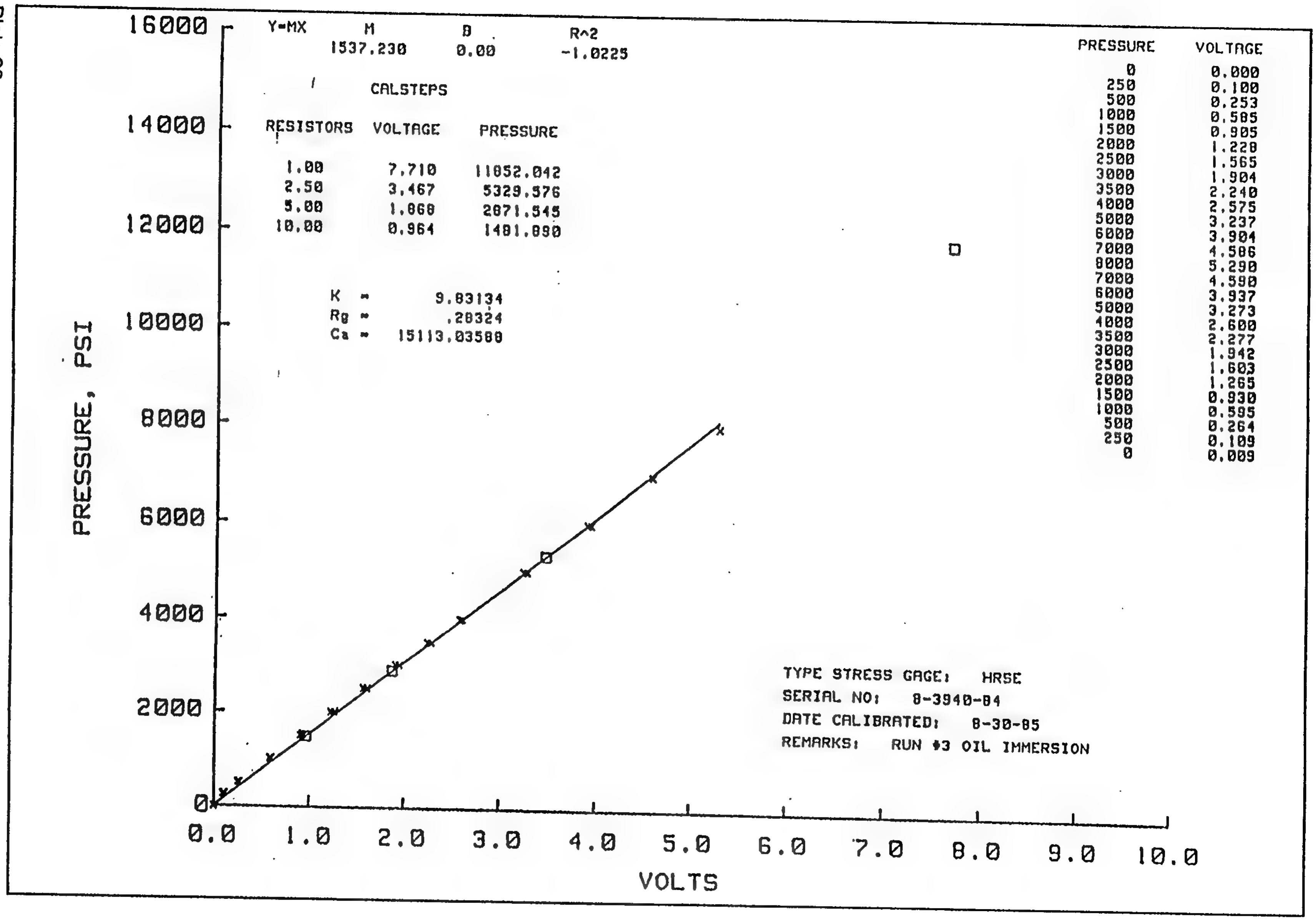

Y=MX M B R^2
1537.230 0.00 -1.0225
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.710 11852.042
2.50 3.467 5329.576
5.00 1.868 2871.545
10.00 0.964 1481.890
K = 9.83134
Rg = .28324
Ca = 15113.03588
PRESSURE VOLTAGE
0 0.000
250 0.100
500 0.253
1000 0.585
1500 0.905
2000 1.228
2500 1.565
3000 1.904
3500 2.240
4000 2.575
5000 3.237
6000 3.904
7000 4.586
8000 5.290
7000 4.590
6000 3.937
5000 3.273
4000 2.600
3500 2.277
3000 1.942
2500 1.603
2000 1.265
1500 0.930
1000 0.595
500 0.264
250 0.109
0 0.009
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #3 OIL IMMERSION
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
VOLTS

Plate 28

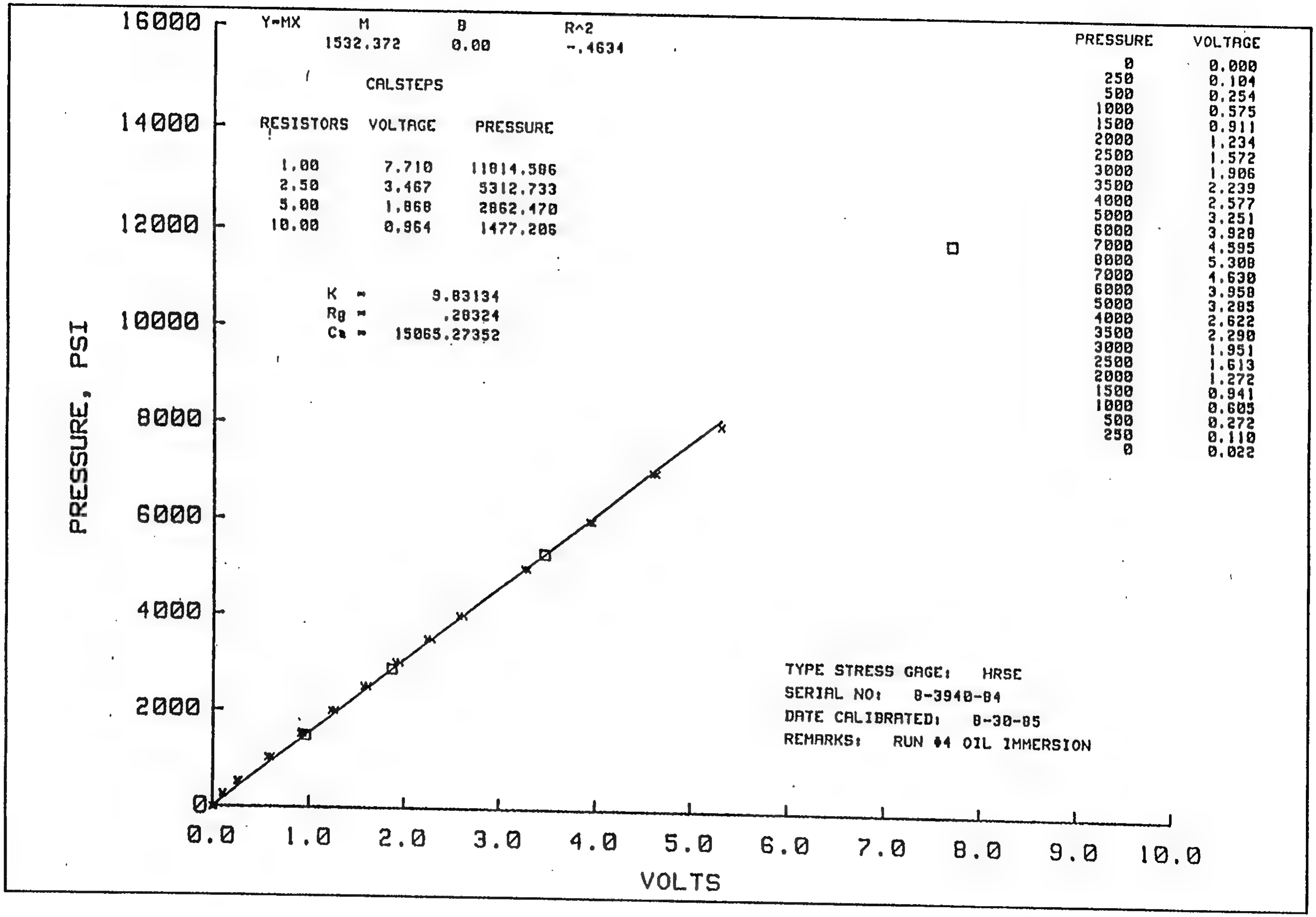
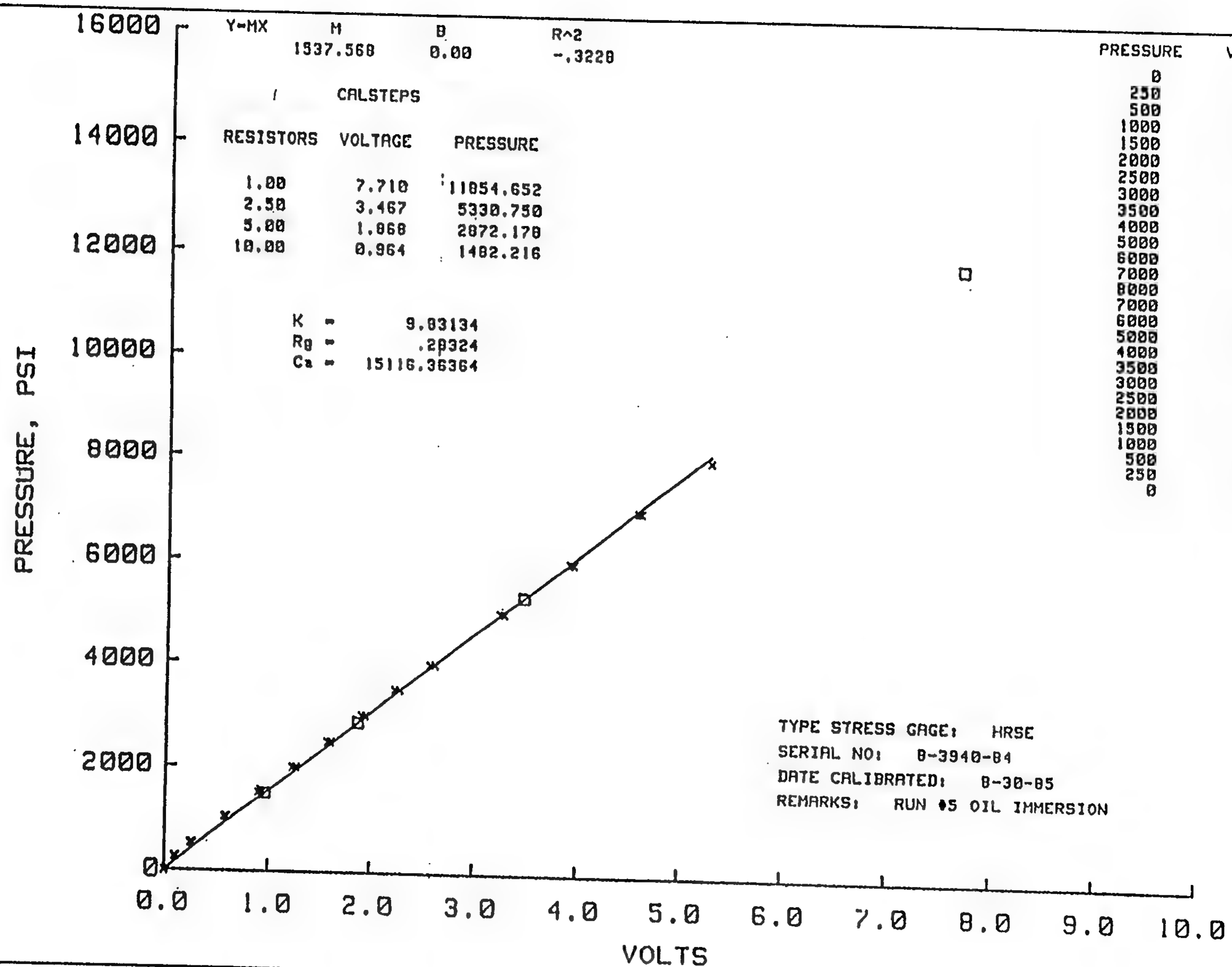

Y=MX M B R^2
1532.372 0.00 -.4634
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.710 11814.586
2.50 3.467 5312.733
5.00 1.868 2862.470
10.00 0.964 1477.206
K = 9.83134
Rg = .28324
Ca = 15065.27352
PRESSURE VOLTAGE
0 0.000
250 0.104
500 0.254
1000 0.575
1500 0.911
2000 1.234
2500 1.572
3000 1.906
3500 2.239
4000 2.577
5000 3.251
6000 3.928
7000 4.595
8000 5.308
7000 4.630
6000 3.958
5000 3.285
4000 2.622
3500 2.290
3000 1.951
2500 1.613
2000 1.272
1500 0.941
1000 0.605
500 0.272
250 0.110
0 0.022
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #4 OIL IMMERSION
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 29



Y-MX	M	B	R^2
	1537.568	0.00	-.3228

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	7.710	11854.652
2.50	3.467	5330.750
5.00	1.868	2872.170
10.00	0.964	1482.216

K = 9.83134
Rg = .28324
Ca = 15116.36364

PRESSURE	VOLTAGE
0	0.000
250	0.099
500	0.252
1000	0.576
1500	0.900
2000	1.231
2500	1.566
3000	1.904
3500	2.229
4000	2.569
5000	3.240
6000	3.910
7000	4.586
8000	5.288
7000	4.614
6000	3.943
5000	3.275
4000	2.614
3500	2.275
3000	1.940
2500	1.600
2000	1.266
1500	0.931
1000	0.594
500	0.269
250	0.107
0	0.009

Plate 30

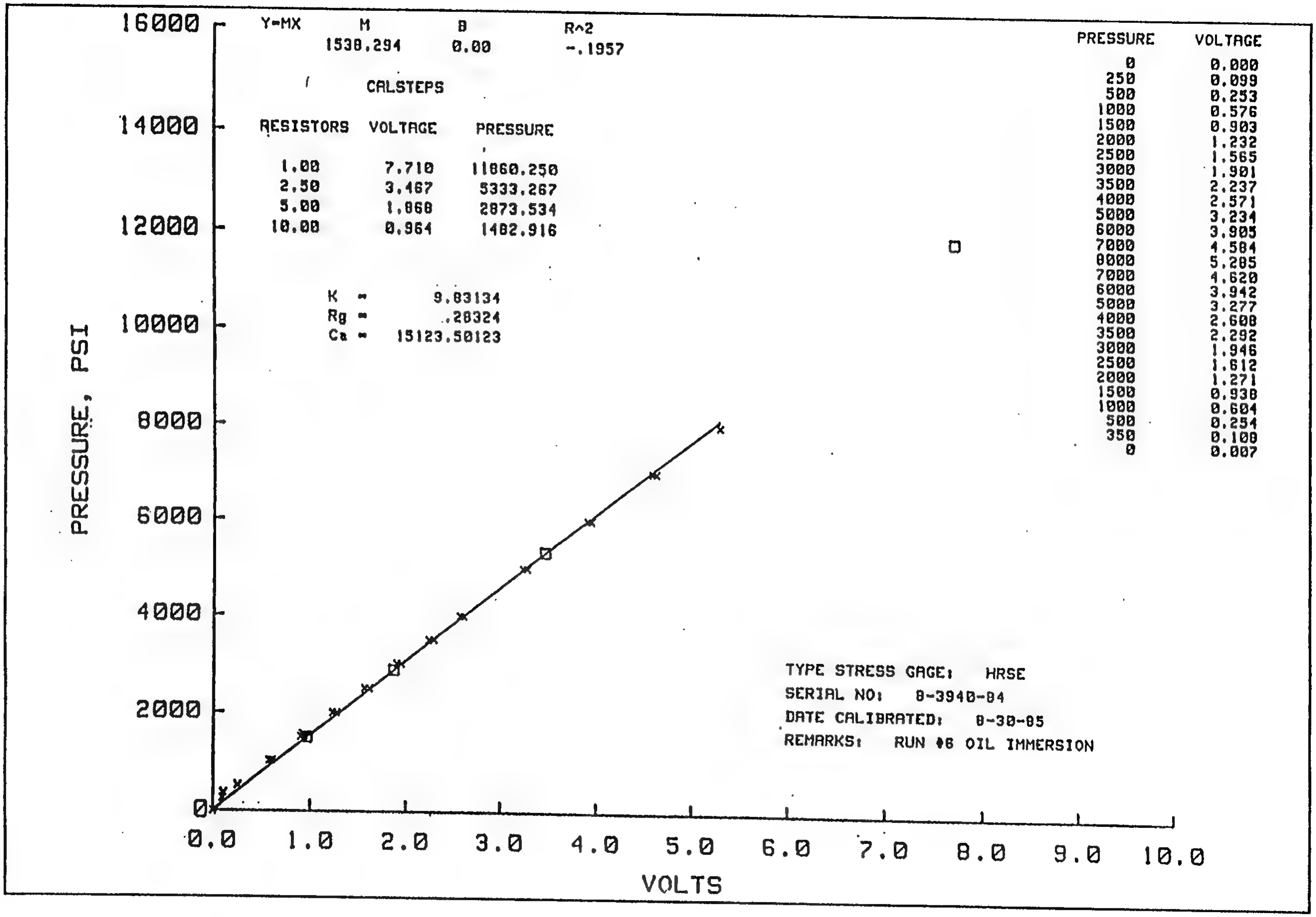

Y=MX M B R^2
1538.294 0.00 -.1957
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.710 11860.250
2.50 3.467 5333.267
5.00 1.868 2873.534
10.00 0.964 1482.916
K = 9.83134
Rg = .28324
Ca = 15123.50123
PRESSURE VOLTAGE
0 0.000
250 0.099
500 0.253
1000 0.576
1500 0.903
2000 1.232
2500 1.565
3000 1.901
3500 2.237
4000 2.571
5000 3.234
6000 3.905
7000 4.584
8000 5.285
7000 4.620
6000 3.942
5000 3.277
4000 2.608
3500 2.292
3000 1.946
2500 1.612
2000 1.271
1500 0.938
1000 0.604
500 0.254
350 0.100
0 0.007
TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #6 OIL IMMERSION
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 31

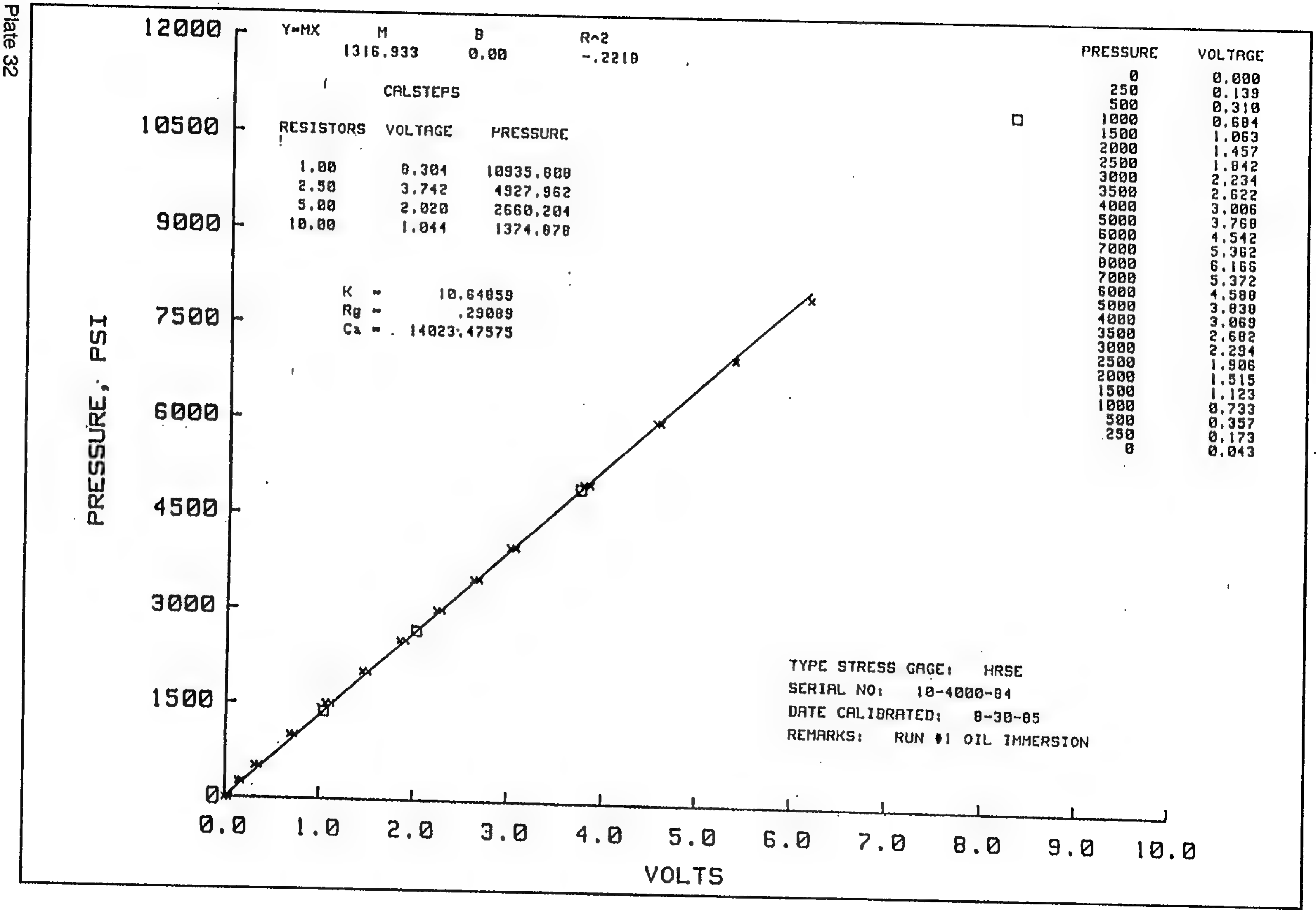

Y=MX
M
1316.933
B
0.00
R^2
-.2210
CALSTEPS
RESISTORS
VOLTAGE
PRESSURE
1.00 8.304 10935.800
2.50 3.742 4927.962
5.00 2.020 2660.204
10.00 1.044 1374.878
K = 10.64059
Rg = .29089
Ca = 14023.47575
PRESSURE VOLTAGE
0 0.000
250 0.139
500 0.310
1000 0.604
1500 1.063
2000 1.457
2500 1.842
3000 2.234
3500 2.622
4000 3.006
5000 3.760
6000 4.542
7000 5.362
8000 6.166
7000 5.372
6000 4.580
5000 3.830
4000 3.069
3500 2.682
3000 2.294
2500 1.906
2000 1.515
1500 1.123
1000 0.733
500 0.357
250 0.173
0 0.043
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #1 OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 32

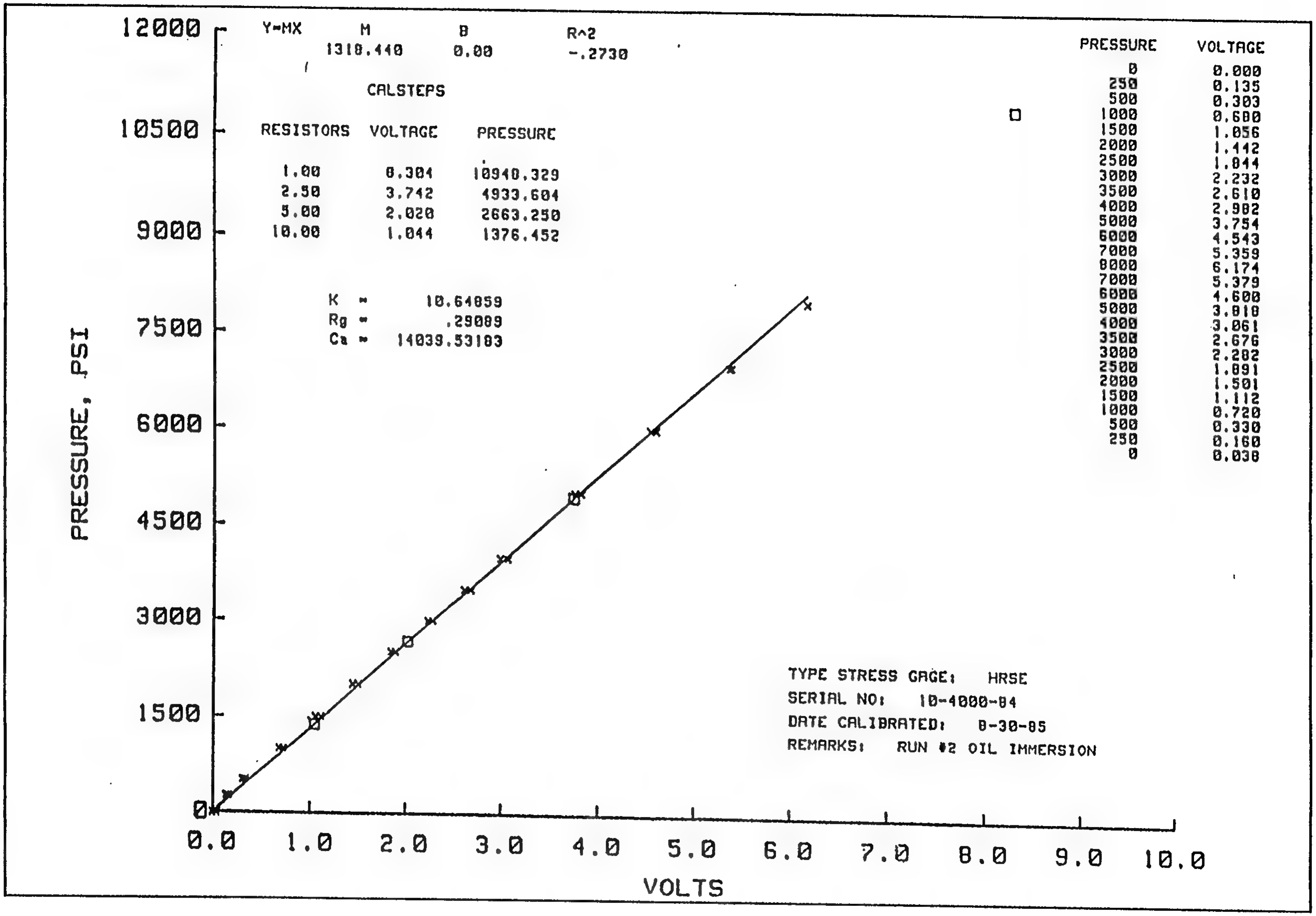
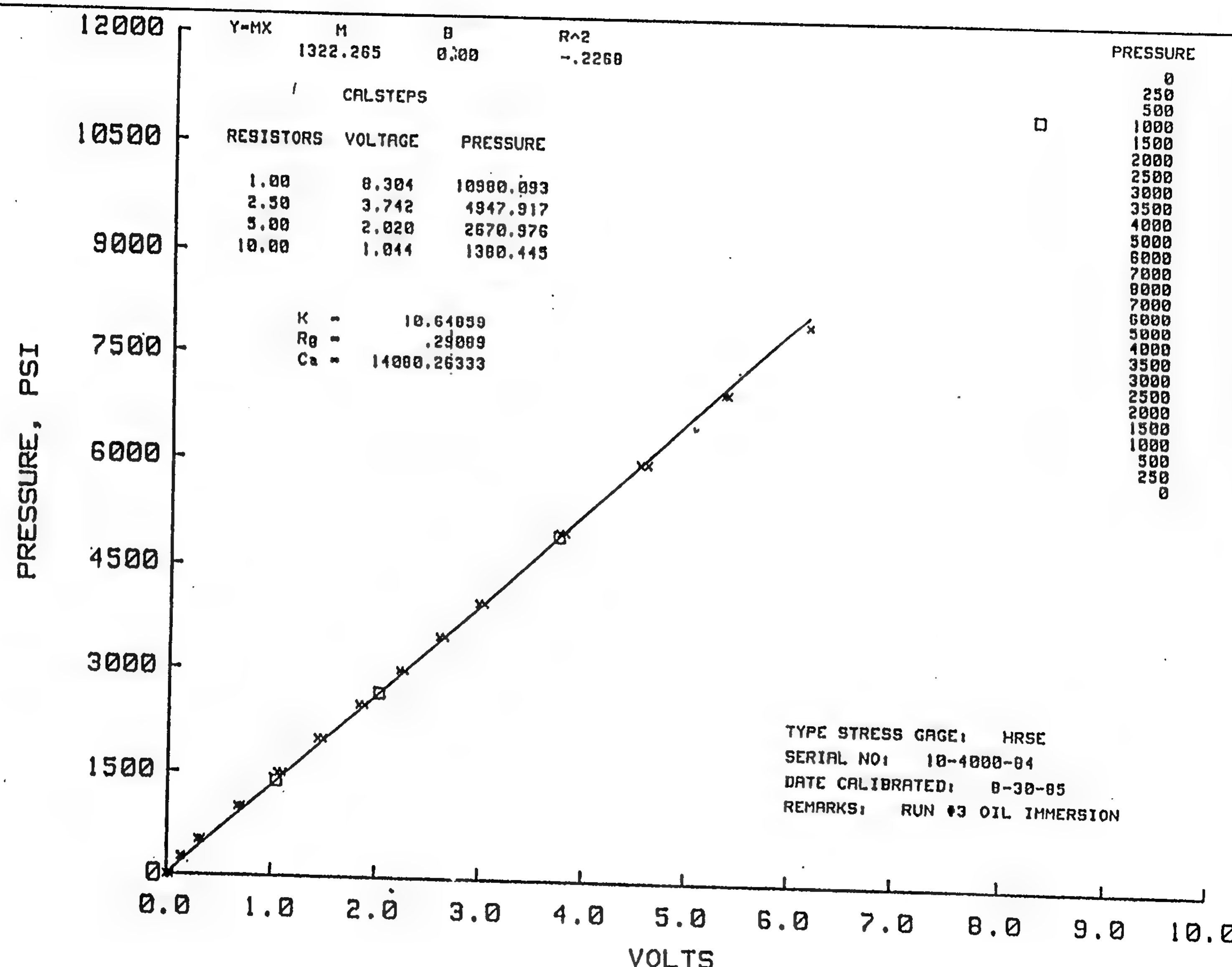

Y=MX M B R^2
1310.440 0.00 -.2730
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 8.304 10940.329
2.50 3.742 4933.604
5.00 2.020 2663.250
10.00 1.044 1376.452
K = 10.64059
Rg = .29089
Ca = 14039.53183
PRESSURE VOLTAGE
0 0.000
250 0.135
500 0.303
1000 0.600
1500 1.056
2000 1.442
2500 1.844
3000 2.232
3500 2.610
4000 2.982
5000 3.754
6000 4.543
7000 5.359
8000 6.174
7000 5.379
6000 4.600
5000 3.818
4000 3.061
3500 2.676
3000 2.282
2500 1.891
2000 1.501
1500 1.112
1000 0.720
500 0.330
250 0.160
0 0.038
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #2 OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 33



Y=MX	M	B	R^2
	1322.265	0.000	-.2268

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	8.304	10980.093
2.50	3.742	4947.917
5.00	2.020	2670.976
10.00	1.044	1380.445

K = 10.64059
Rg = .29089
Ca = 14000.26333

PRESSURE	VOLTAGE
0	0.000
250	0.129
500	0.300
1000	0.679
1500	1.055
2000	1.439
2500	1.829
3000	2.216
3500	2.596
4000	2.976
5000	3.747
6000	4.523
7000	5.342
8000	6.167
7000	5.376
6000	4.590
5000	3.803
4000	3.033
3500	2.652
3000	2.266
2500	1.881
2000	1.490
1500	1.102
1000	0.709
500	0.332
250	0.147
0	0.034

Plate 34

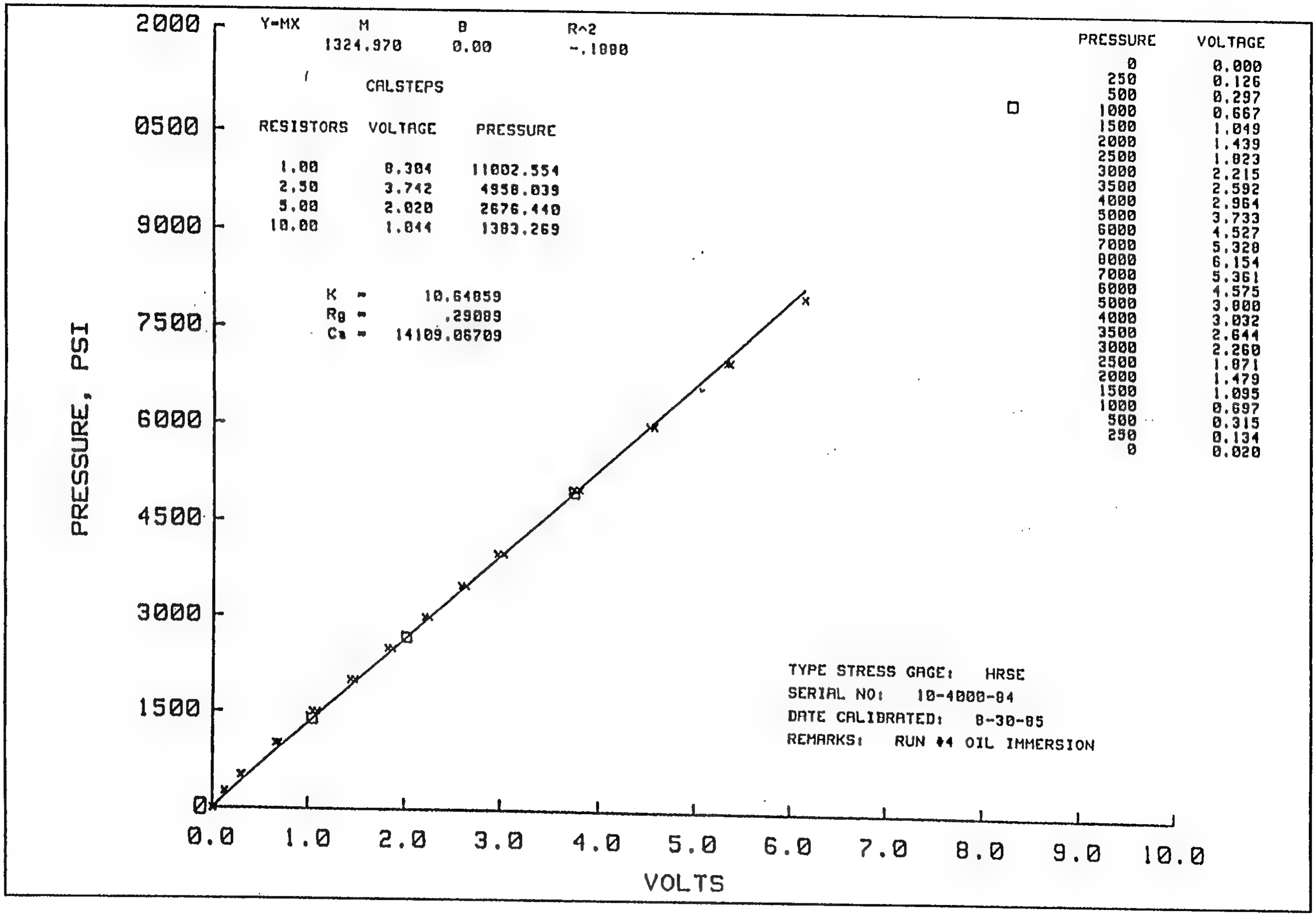

Y=MX M B R^2
1324.970 0.00 -.1000
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 8.304 11002.554
2.50 3.742 4958.039
5.00 2.020 2676.440
10.00 1.044 1383.269
K = 10.64859
Rg = .29089
Ca = 14109.06709
PRESSURE VOLTAGE
0 0.000
250 0.126
500 0.297
1000 0.667
1500 1.049
2000 1.439
2500 1.823
3000 2.215
3500 2.592
4000 2.964
5000 3.733
6000 4.527
7000 5.320
8000 6.154
7000 5.361
6000 4.575
5000 3.800
4000 3.032
3500 2.644
3000 2.260
2500 1.871
2000 1.479
1500 1.095
1000 0.697
500 0.315
250 0.134
0 0.020
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #4 OIL IMMERSION
PRESSURE, PSI
2000
0500
9000
7500
6000
4500
3000
1500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 35

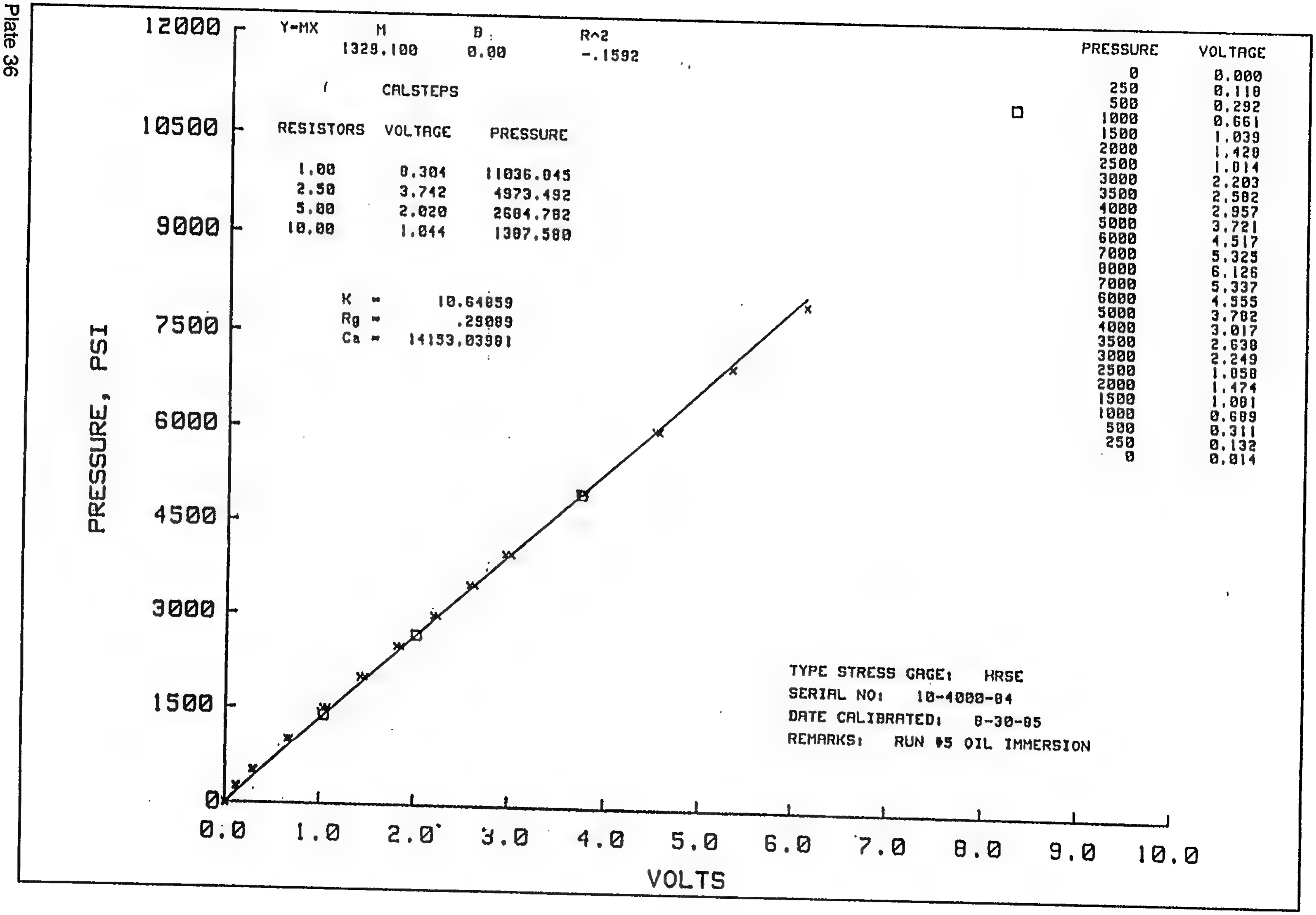

Y=MX
M
1329.100
B
0.00
R^2
-.1592
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 0.304 11036.045
2.50 3.742 4973.492
5.00 2.020 2684.782
10.00 1.044 1307.580
K = 10.64059
Rg = .29089
Ca = 14153.03901
PRESSURE VOLTAGE
0 0.000
250 0.110
500 0.292
1000 0.661
1500 1.039
2000 1.420
2500 1.014
3000 2.203
3500 2.582
4000 2.957
5000 3.721
6000 4.517
7000 5.325
8000 6.126
7000 5.337
6000 4.555
5000 3.782
4000 3.017
3500 2.630
3000 2.249
2500 1.858
2000 1.474
1500 1.081
1000 0.689
500 0.311
250 0.132
0 0.014
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 8-30-85
REMARKS: RUN #5 OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 36

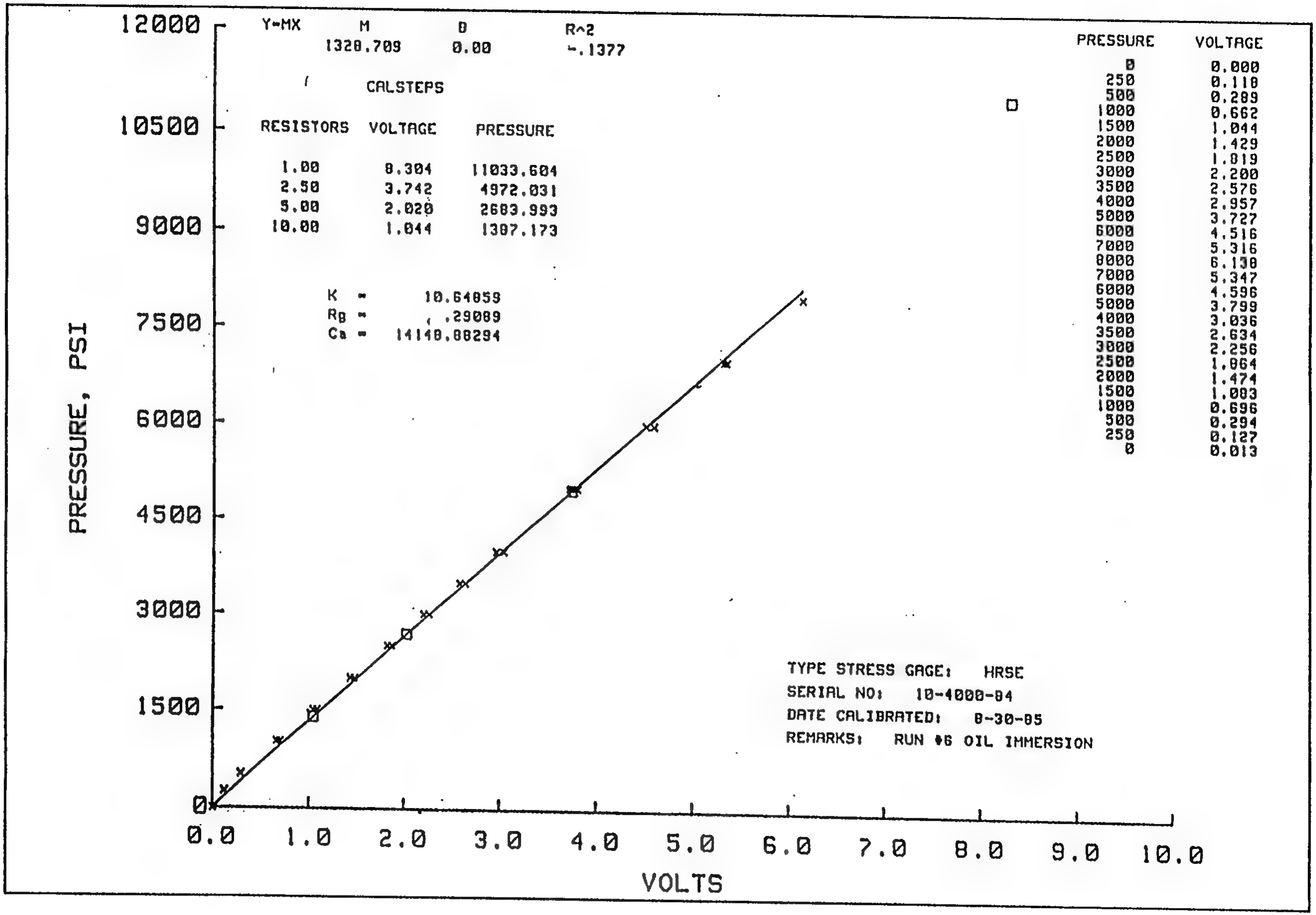

Y=MX
M
1328.709
B
0.00
R^2
-.1377
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 8.304 11033.604
2.50 3.742 4972.031
5.00 2.020 2683.993
10.00 1.044 1387.173
K = 10.64059
Rg = .29089
Ca = 14140.08294
PRESSURE VOLTAGE
0 0.000
250 0.110
500 0.289
1000 0.662
1500 1.044
2000 1.429
2500 1.819
3000 2.200
3500 2.576
4000 2.957
5000 3.727
6000 4.516
7000 5.316
8000 6.130
7000 5.347
6000 4.596
5000 3.799
4000 3.036
3500 2.634
3000 2.256
2500 1.864
2000 1.474
1500 1.083
1000 0.696
500 0.294
250 0.127
0 0.013
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-04
DATE CALIBRATED: 8-30-85
REMARKS: RUN #6 OIL IMMERSION
PRESSURE, PSI
12000
10500
9000
7500
6000
4500
3000
1500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 37

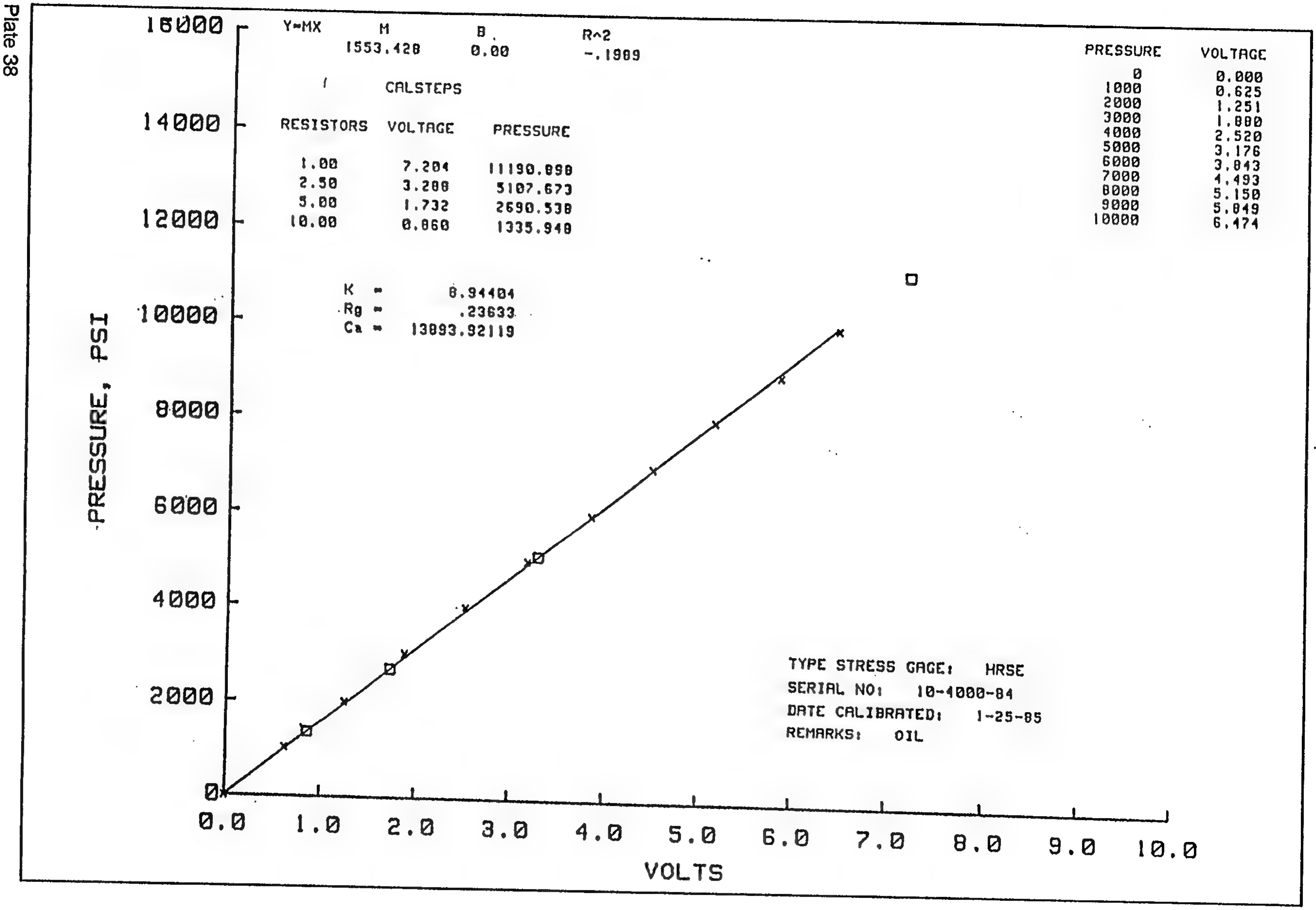
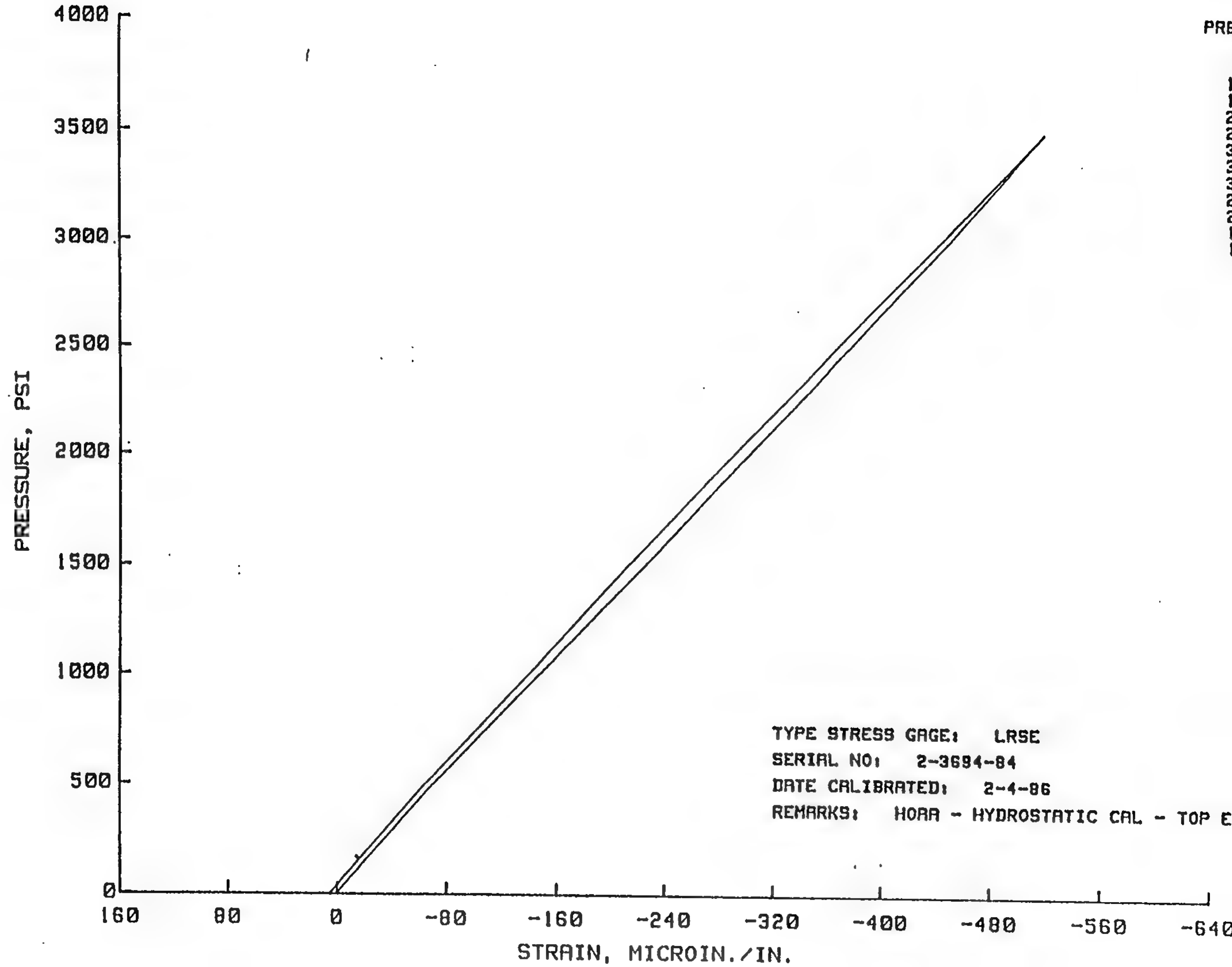
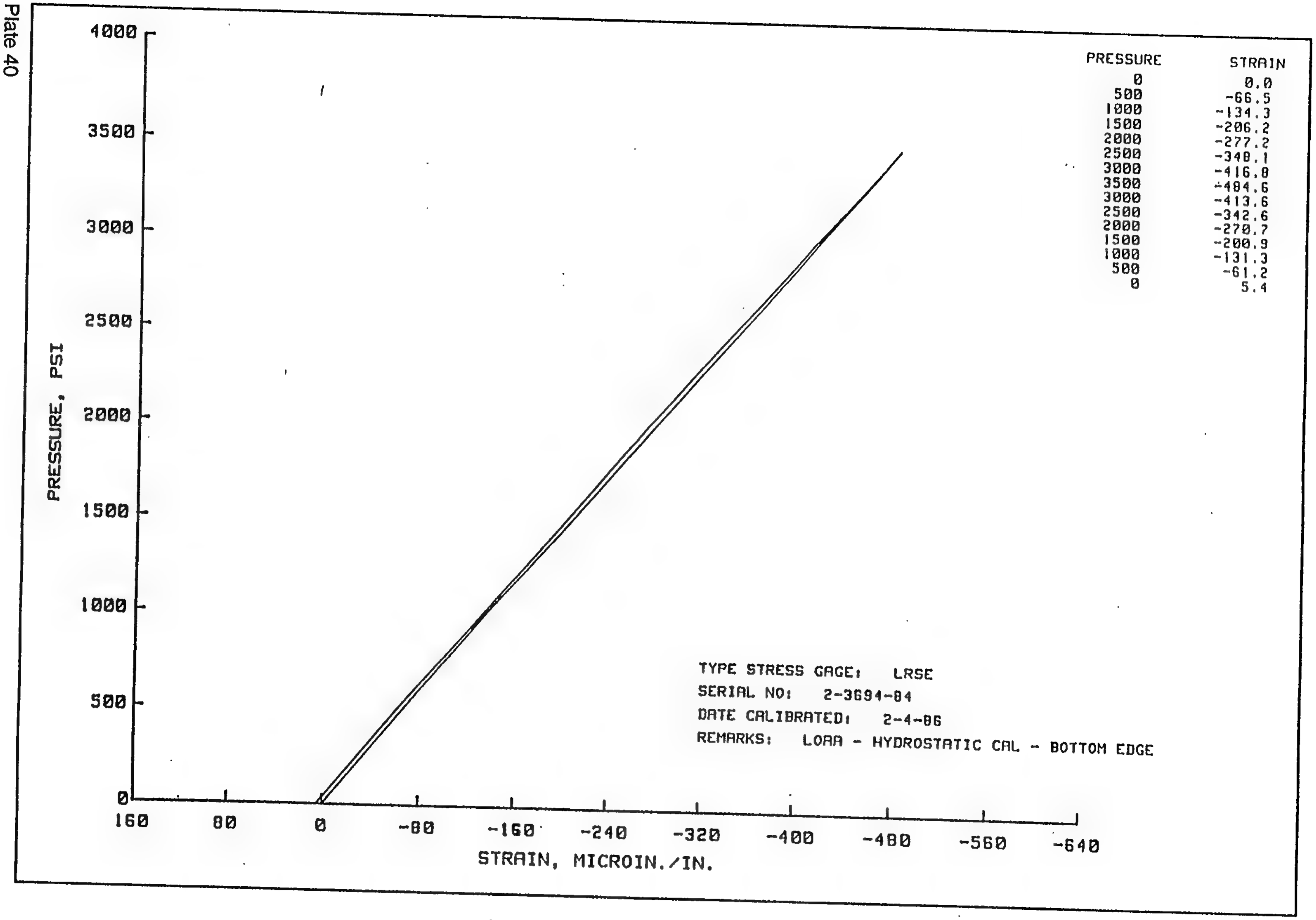

Y=MX
M
1553.428
B
0.00
R^2
-.1989
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 7.204 11190.898
2.50 3.288 5107.673
5.00 1.732 2690.538
10.00 0.860 1335.948
K = 8.94404
Rg = .23633
Ca = 13893.92119
PRESSURE VOLTAGE
0 0.000
1000 0.625
2000 1.251
3000 1.880
4000 2.520
5000 3.176
6000 3.843
7000 4.493
8000 5.150
9000 5.849
10000 6.474
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 1-25-85
REMARKS: OIL
PRESSURE, PSI
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 38



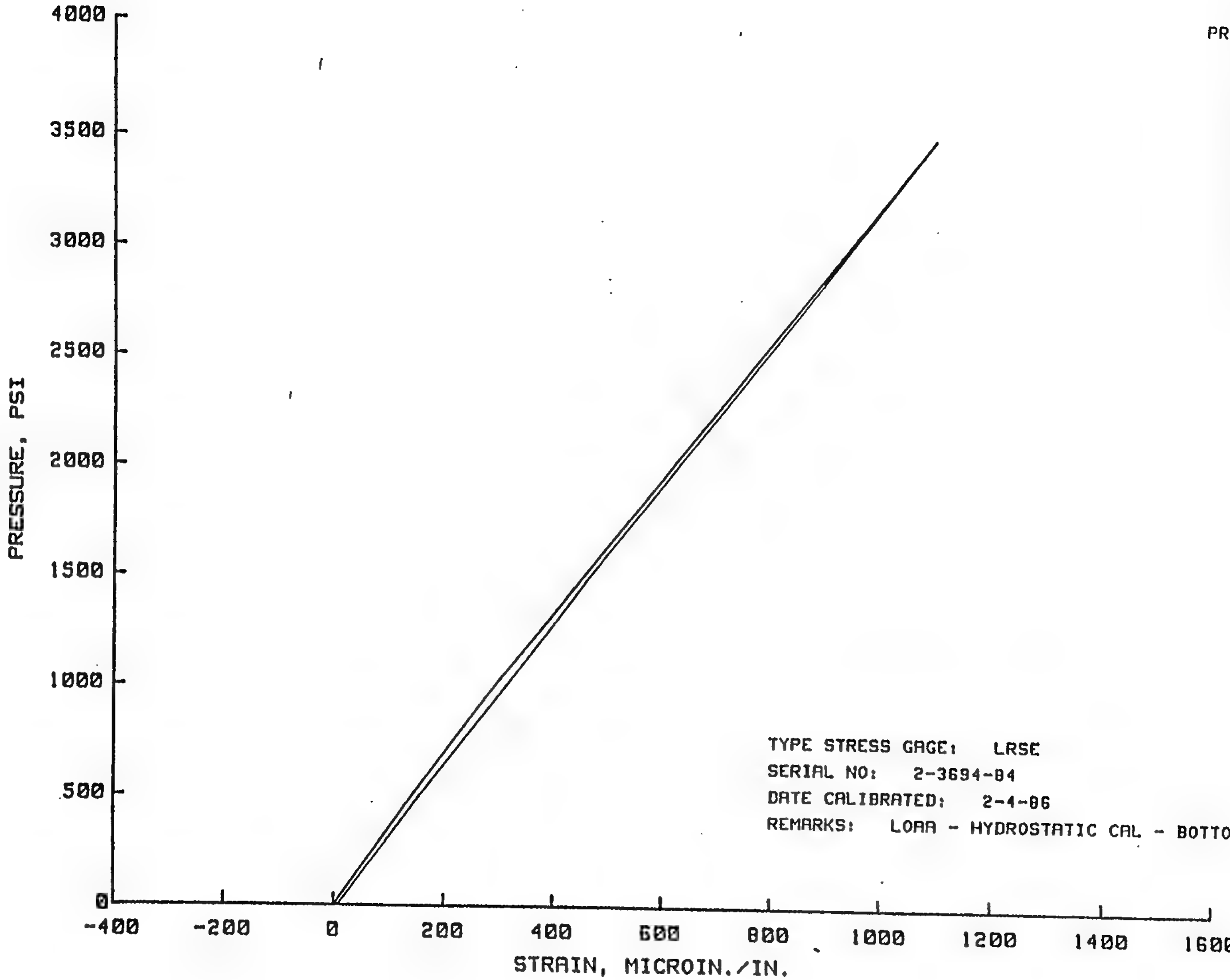
PRESSURE	STRAIN
0	0.0
500	-70.6
1000	-147.4
1500	-224.9
2000	-302.3
2500	-378.3
3000	-452.9
3500	-523.8
3000	-446.2
2500	-368.3
2000	-291.0
1500	-212.3
1000	-139.4
500	-64.6
0	5.6

TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3694-84
DATE CALIBRATED: 2-4-86
REMARKS: HOAA - HYDROSTATIC CAL - TOP EDGE



PRESSURE	STRAIN
0	0.0
500	-66.5
1000	-134.3
1500	-206.2
2000	-277.2
2500	-348.1
3000	-416.8
3500	-484.6
3000	-413.6
2500	-342.6
2000	-270.7
1500	-200.9
1000	-131.3
500	-61.2
0	5.4

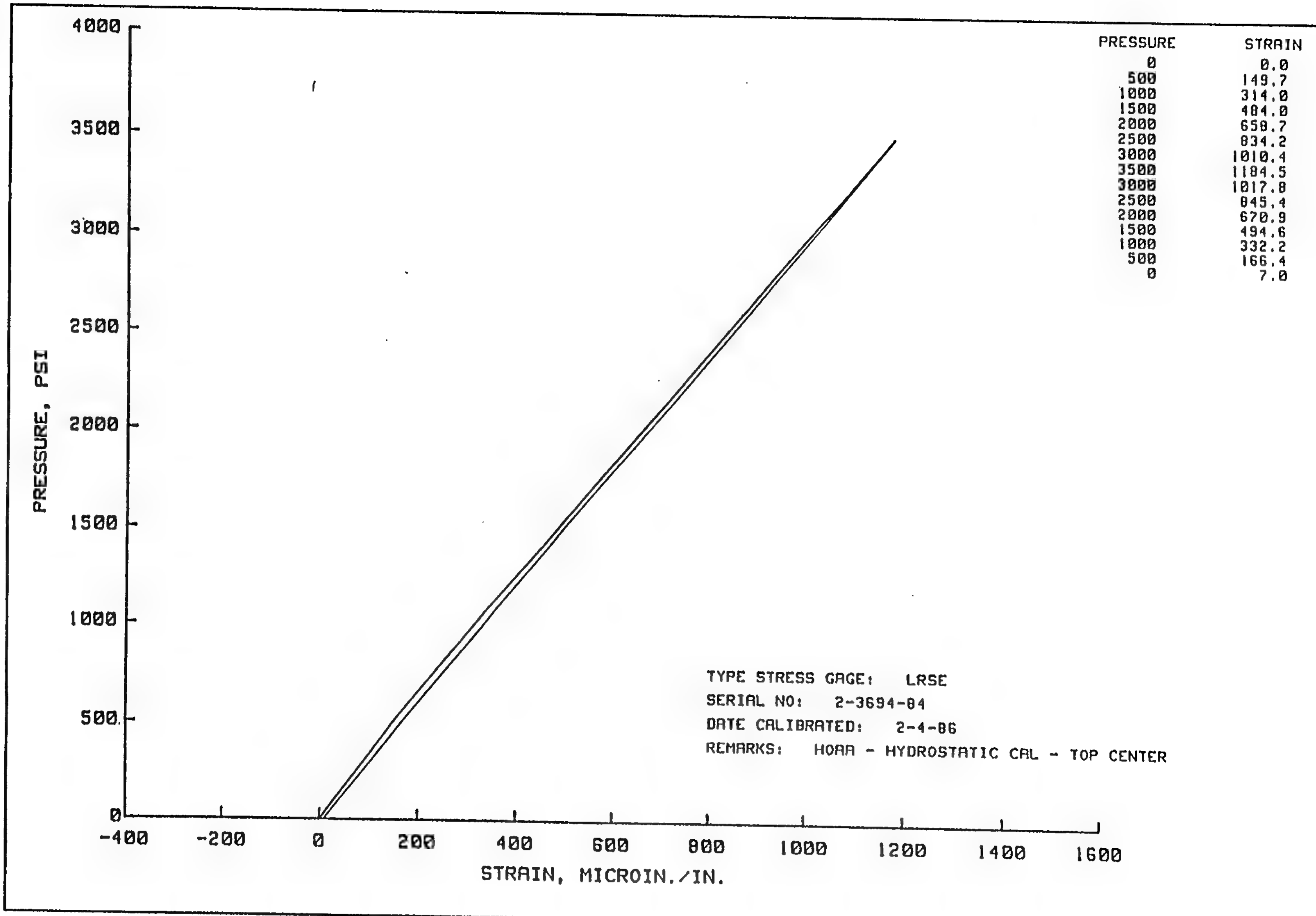
Plate 40



PRESSURE	STRAIN
0	0.0
500	143.3
1000	292.9
1500	455.5
2000	618.7
2500	782.7
3000	946.7
3500	1100.5
3000	951.2
2500	790.7
2000	627.5
1500	465.9
1000	313.5
500	156.1
0	5.9

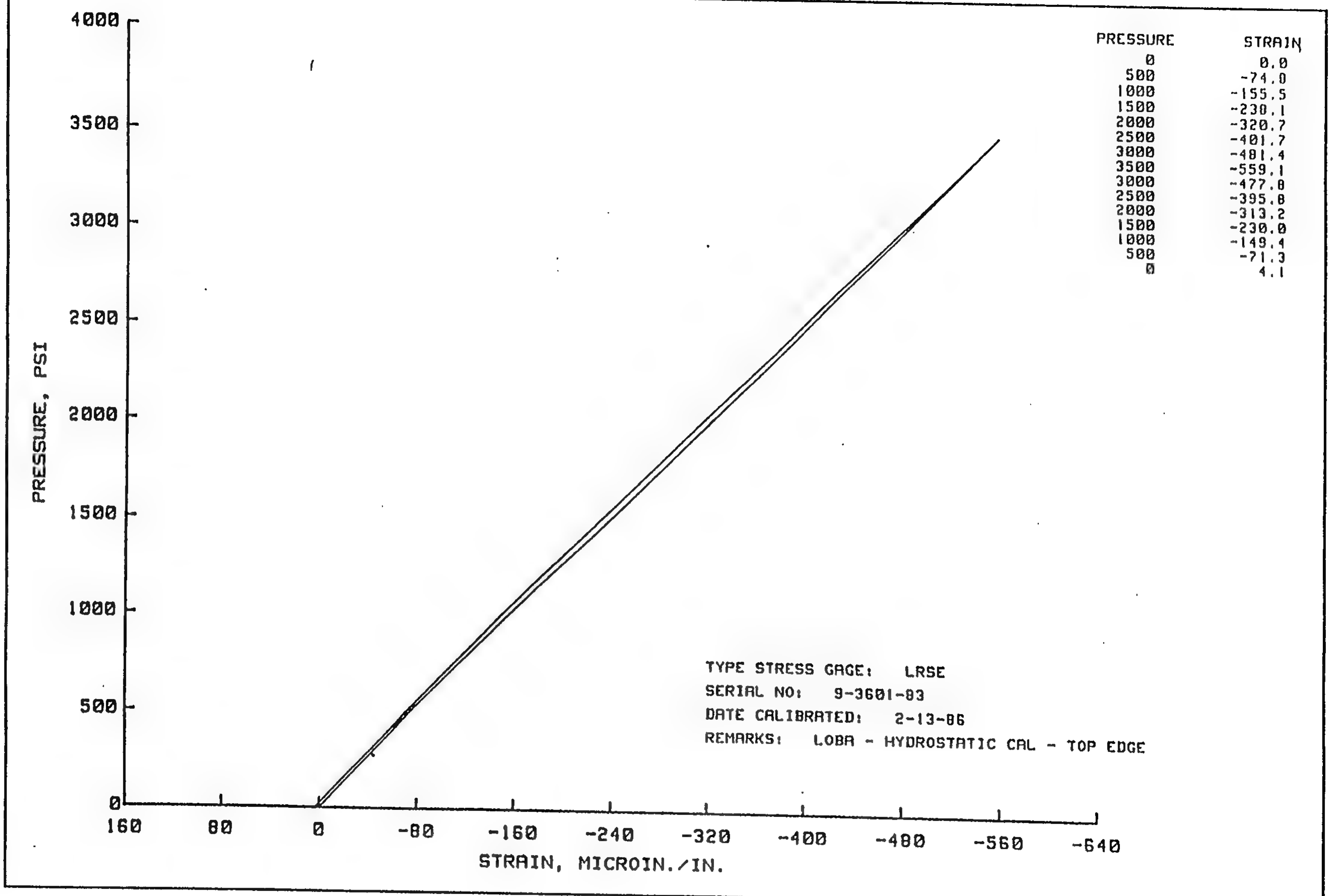
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3694-84
DATE CALIBRATED: 2-4-86
REMARKS: LOAA - HYDROSTATIC CAL - BOTTOM CENTER

Plate 41



PRESSURE	STRAIN
0	0.0
500	149.7
1000	314.0
1500	484.0
2000	658.7
2500	834.2
3000	1010.4
3500	1184.5
3000	1017.8
2500	845.4
2000	670.9
1500	494.6
1000	332.2
500	166.4
0	7.0

Plate 42



PRESSURE	STRAIN
0	0.0
500	-74.0
1000	-155.5
1500	-230.1
2000	-320.7
2500	-401.7
3000	-481.4
3500	-559.1
3000	-477.8
2500	-395.8
2000	-313.2
1500	-230.0
1000	-149.4
500	-71.3
0	4.1

Plate 43

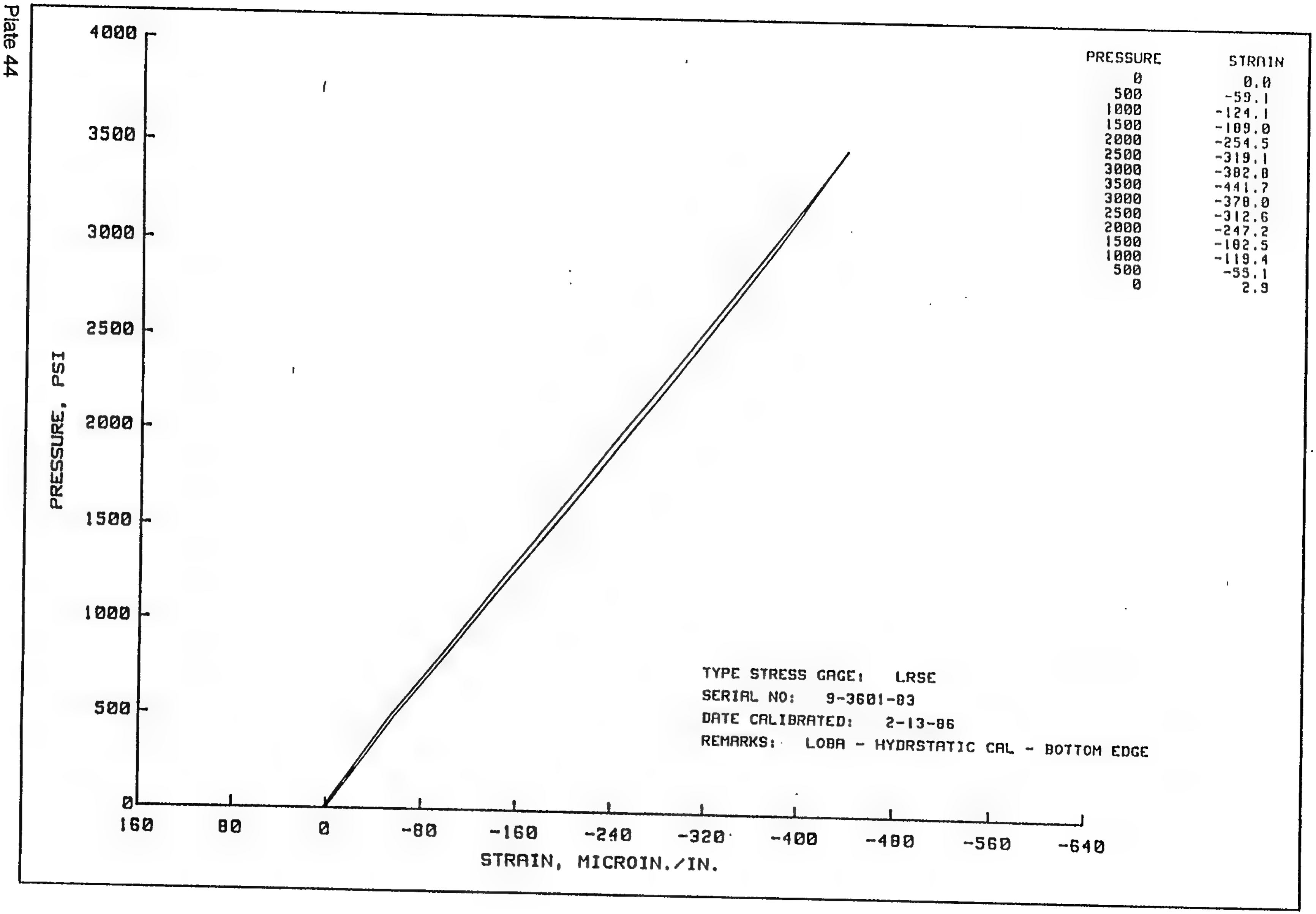
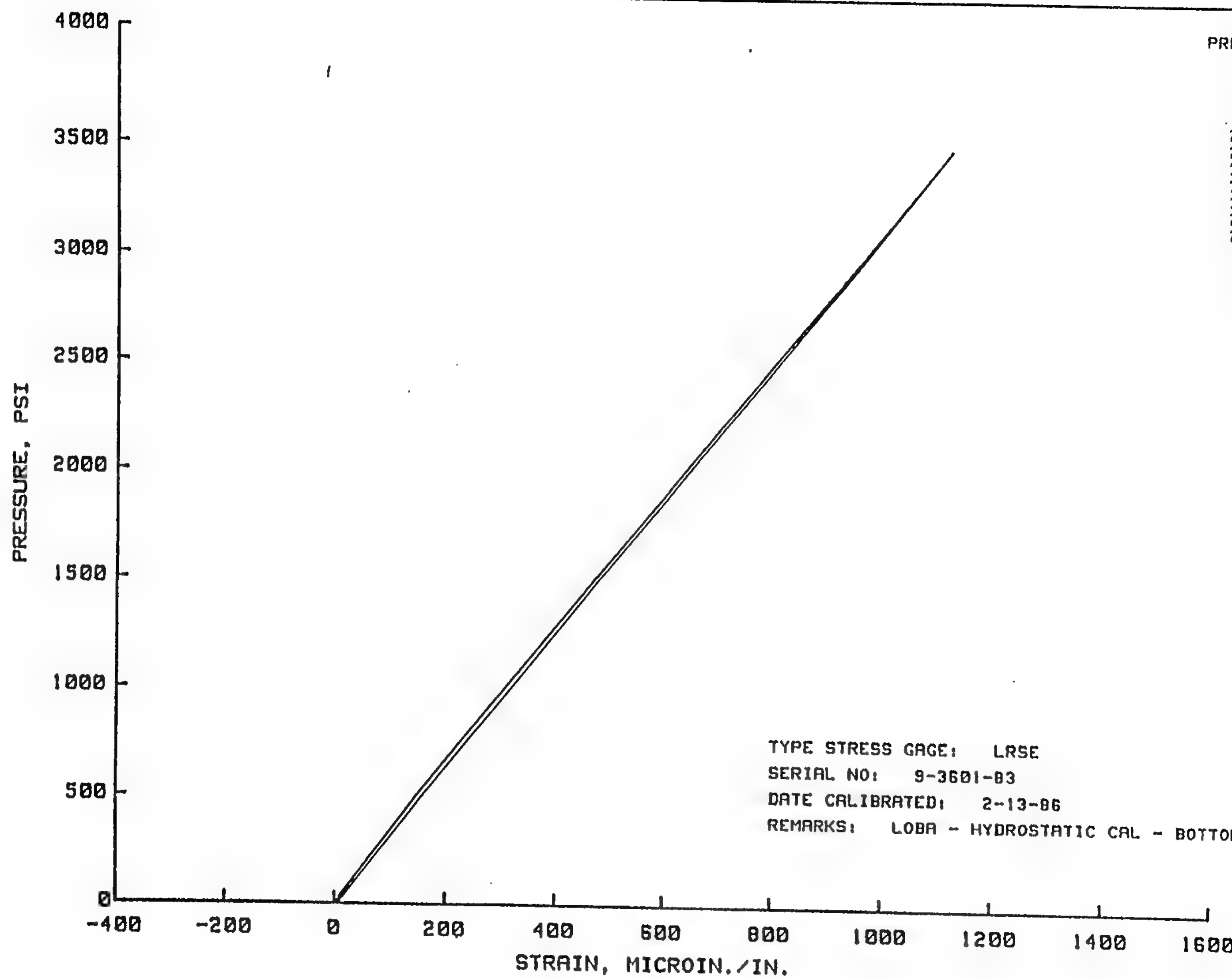
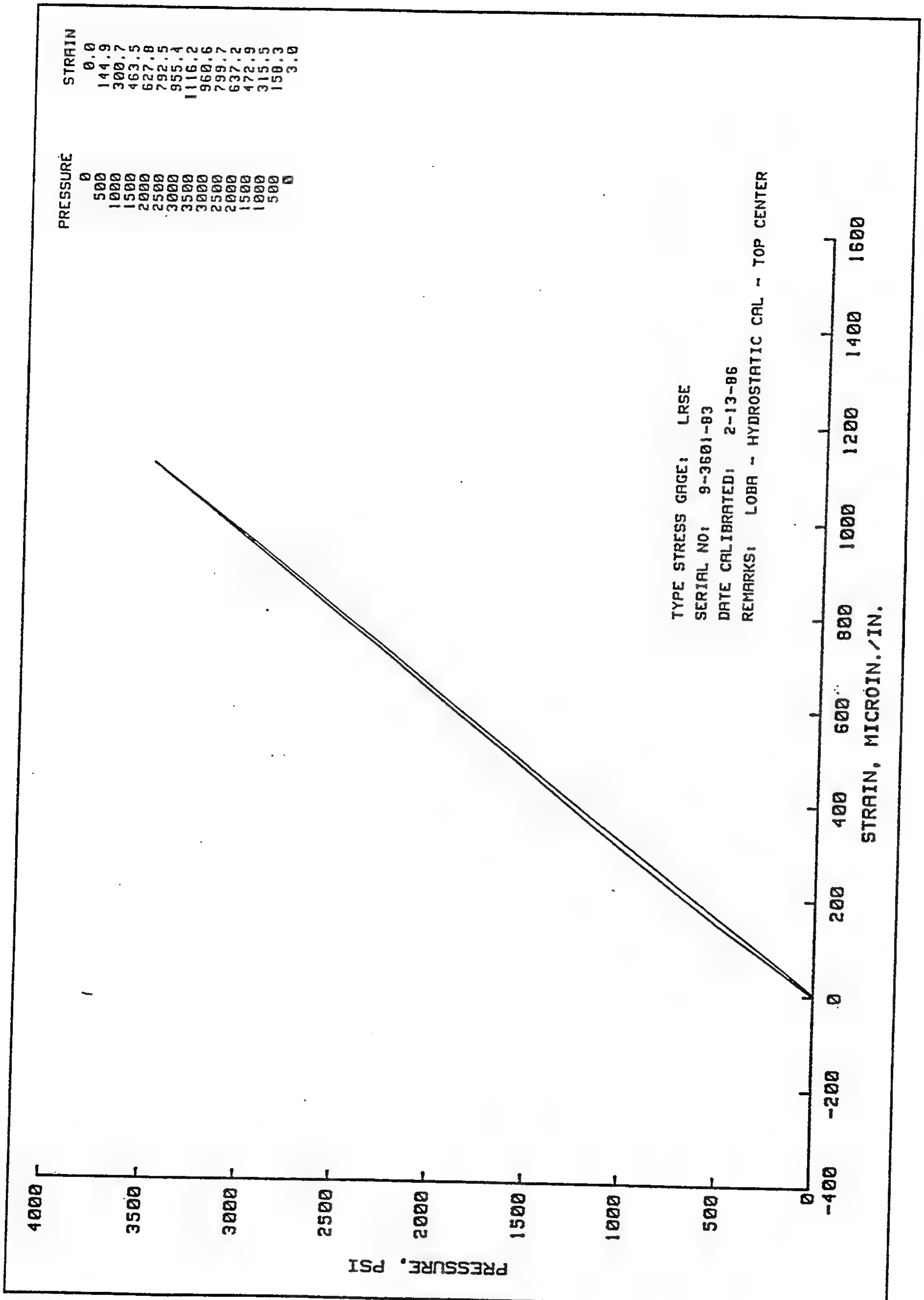

PRESSURE STRAIN
0 0.0
500 -59.1
1000 -124.1
1500 -189.0
2000 -254.5
2500 -319.1
3000 -382.8
3500 -441.7
3000 -378.0
2500 -312.6
2000 -247.2
1500 -182.5
1000 -119.4
500 -55.1
0 2.9
TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3601-83
DATE CALIBRATED: 2-13-86
REMARKS: LOBA - HYDRSTATIC CAL - BOTTOM EDGE
PRESSURE, PSI
4000
3500
3000
2500
2000
1500
1000
500
0
160
80
0
-80
-160
-240
-320
-400
-480
-560
-640
STRAIN, MICROIN./IN.

Plate 44



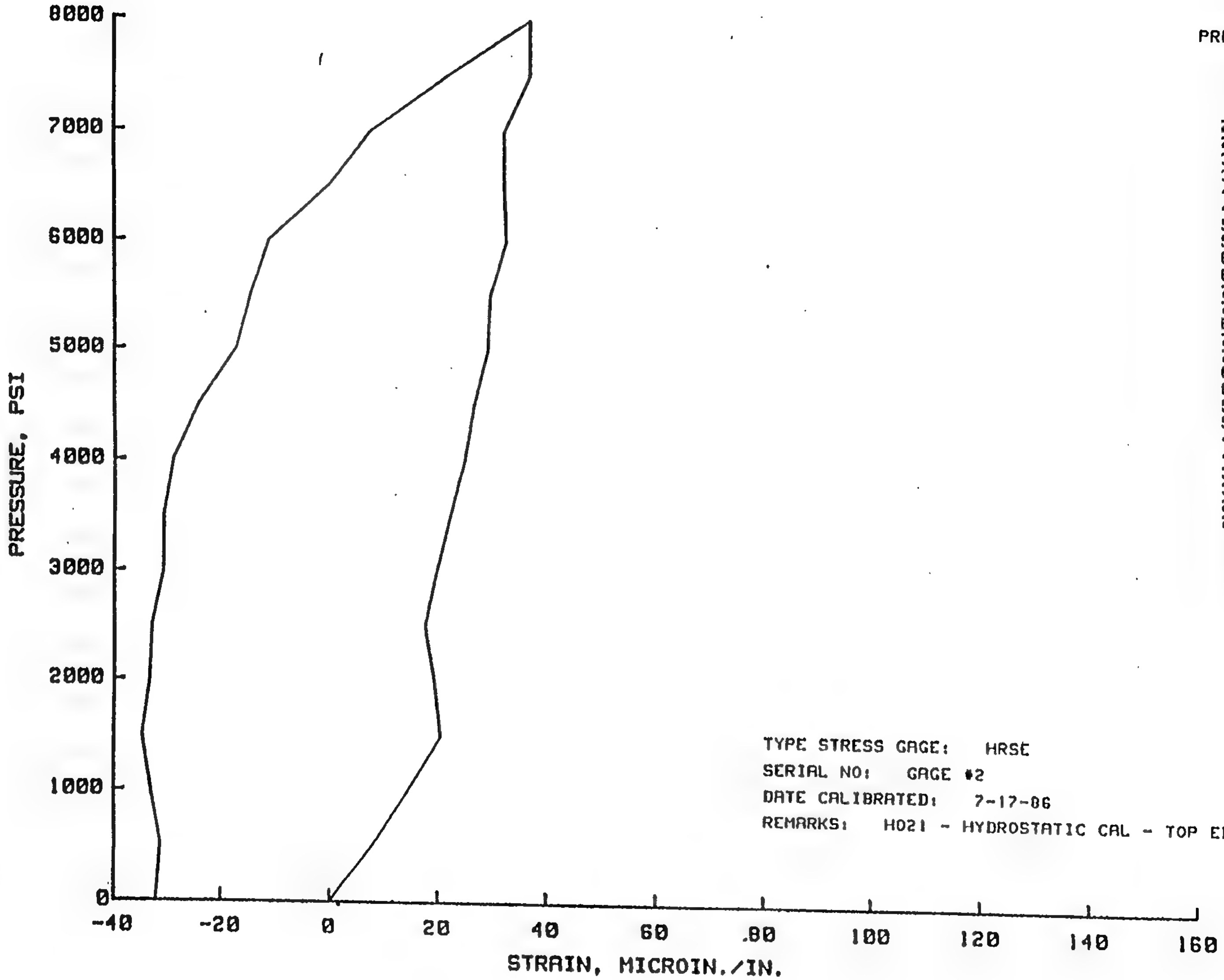
PRESSURE	STRAIN
0	0.0
500	147.0
1000	306.1
1500	470.3
2000	637.4
2500	804.1
3000	970.1
3500	1134.6
3000	973.9
2500	809.9
2000	644.2
1500	477.4
1000	316.5
500	157.4
0	3.9

Plate 45



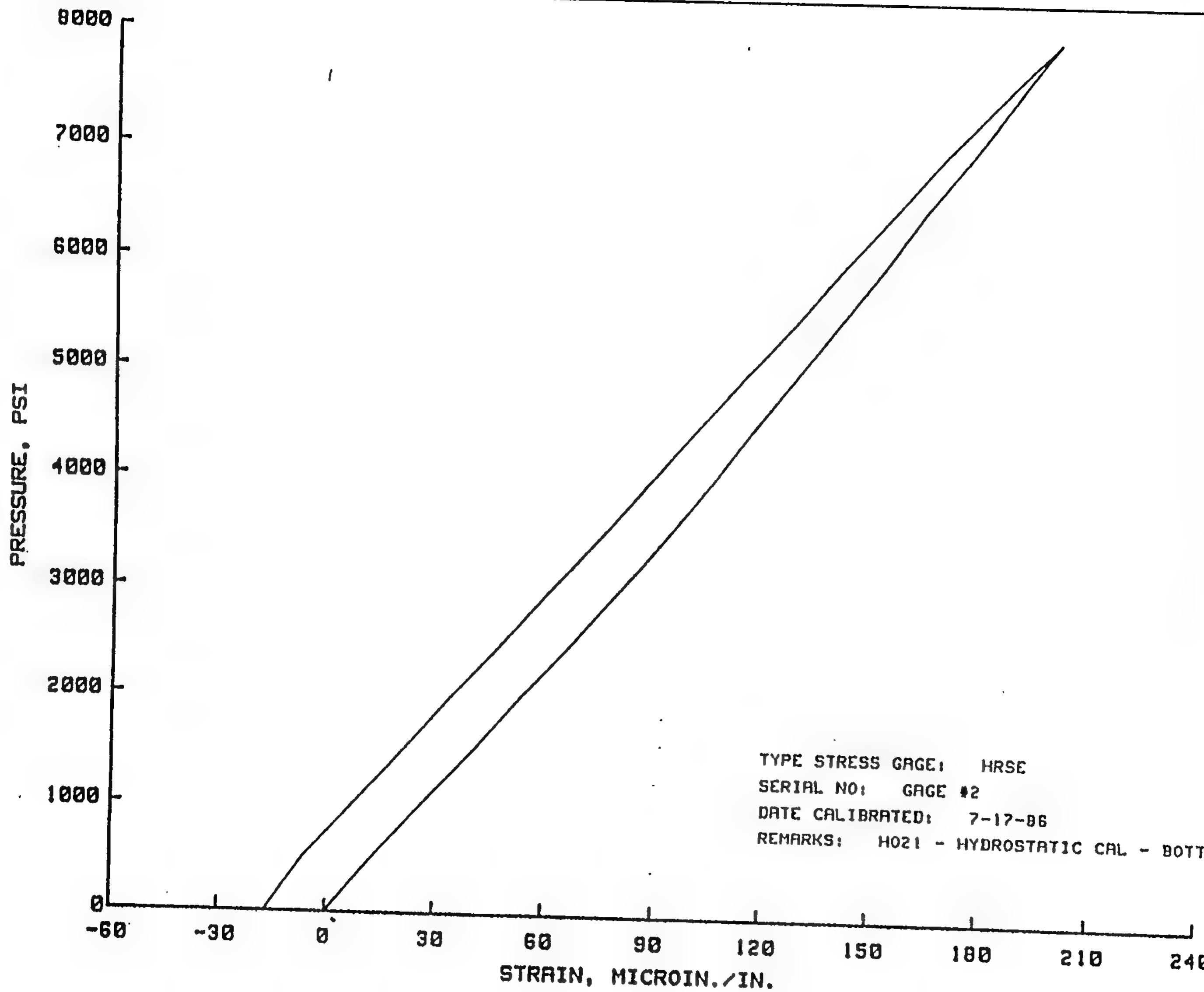
PRESSURE	STRAIN
0	0.0
500	144.9
1000	300.7
1500	463.5
2000	627.8
2500	792.5
3000	955.4
3500	1116.2
3000	960.6
2500	799.7
2000	637.2
1500	472.9
1000	315.5
500	150.3
0	3.0

Plate 46



PRESSURE	STRAIN
0	0.0
500	7.8
1000	14.3
1500	20.4
2000	19.1
2500	17.4
3000	19.6
3500	22.2
4000	24.8
4500	26.5
5000	29.1
5500	29.6
6000	32.6
6500	32.2
7000	32.2
7500	37.0
8000	37.0
7500	21.7
7000	7.4
6500	-.4
6000	-11.3
5500	-14.8
5000	-17.4
4500	-24.3
4000	-29.1
3500	-30.9
3000	-30.9
2500	-33.0
2000	-33.5
1500	-34.8
1000	-33.0
500	-31.3
0	-32.2

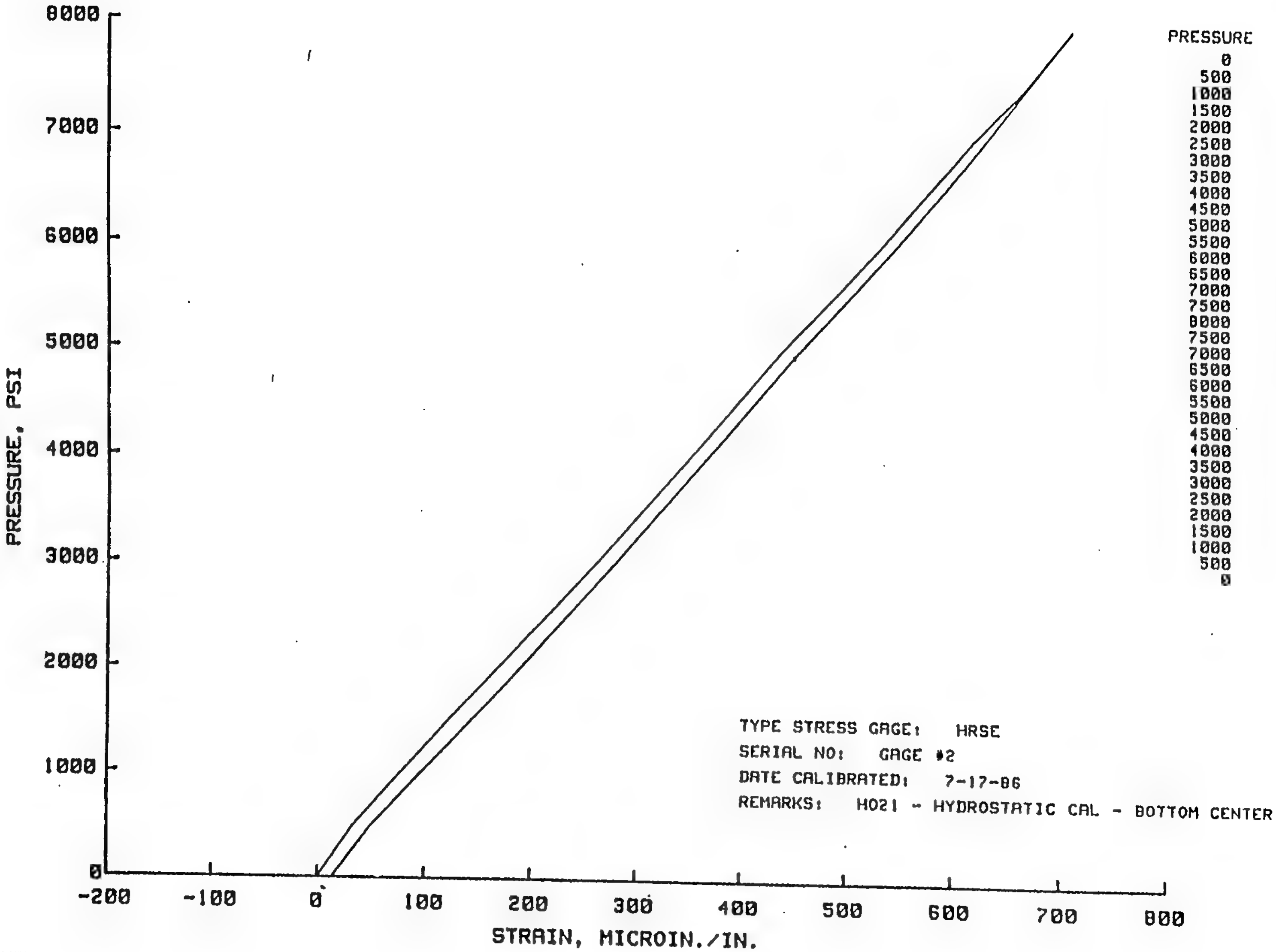
Plate 47



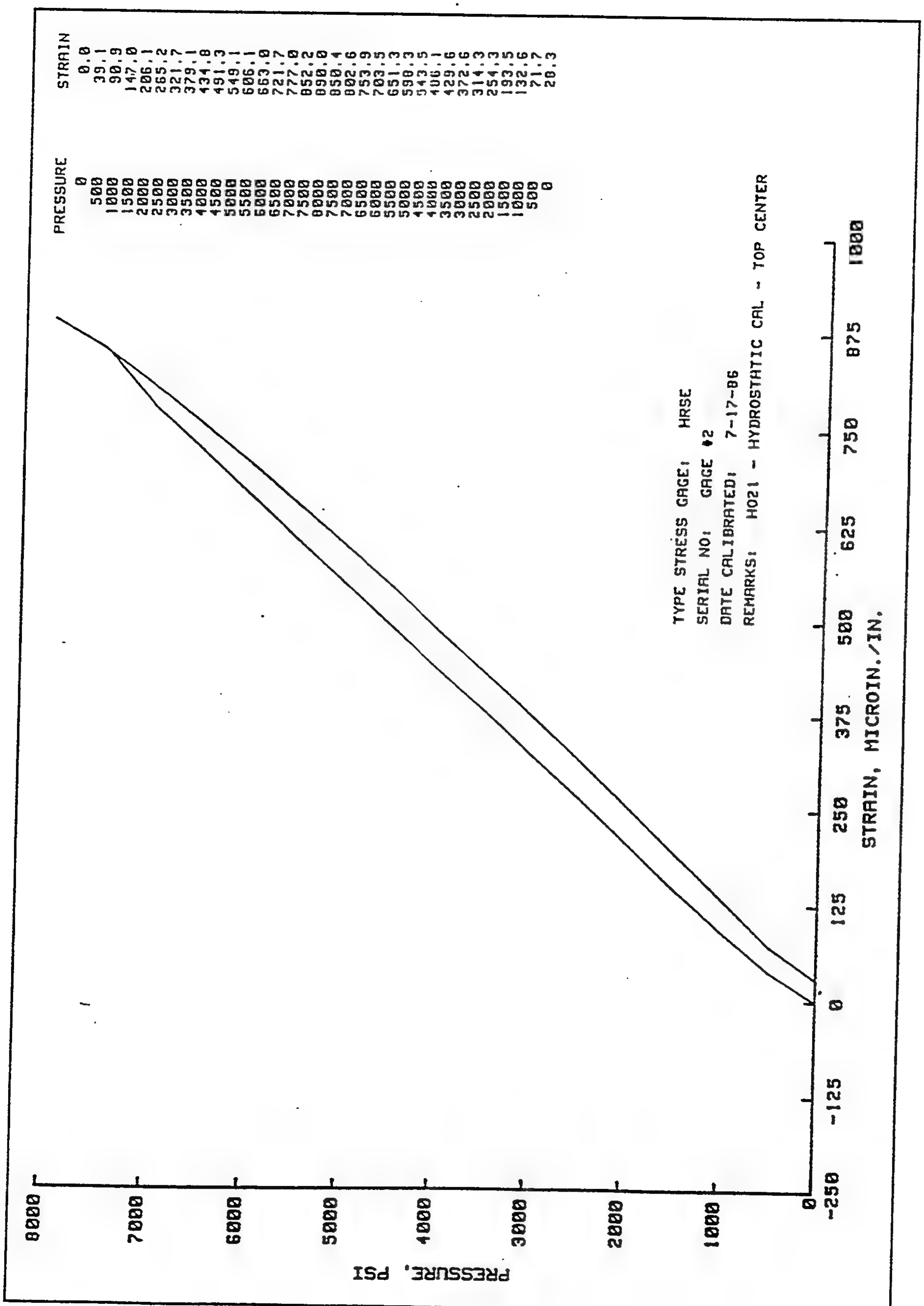
PRESSURE	STRAIN
0	0.0
500	12.6
1000	26.1
1500	40.4
2000	53.5
2500	67.4
3000	80.0
3500	93.0
4000	105.7
4500	117.4
5000	129.6
5500	141.7
6000	153.9
6500	164.8
7000	177.4
7500	189.1
8000	200.9
7500	185.2
7000	170.0
6500	156.5
6000	142.6
5500	129.6
5000	115.2
4500	101.7
4000	88.3
3500	75.2
3000	61.3
2500	48.3
2000	34.3
1500	20.9
1000	7.0
500	-6.5
0	-17.0

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H021 - HYDROSTATIC CAL - BOTTOM EDGE

Plate 48

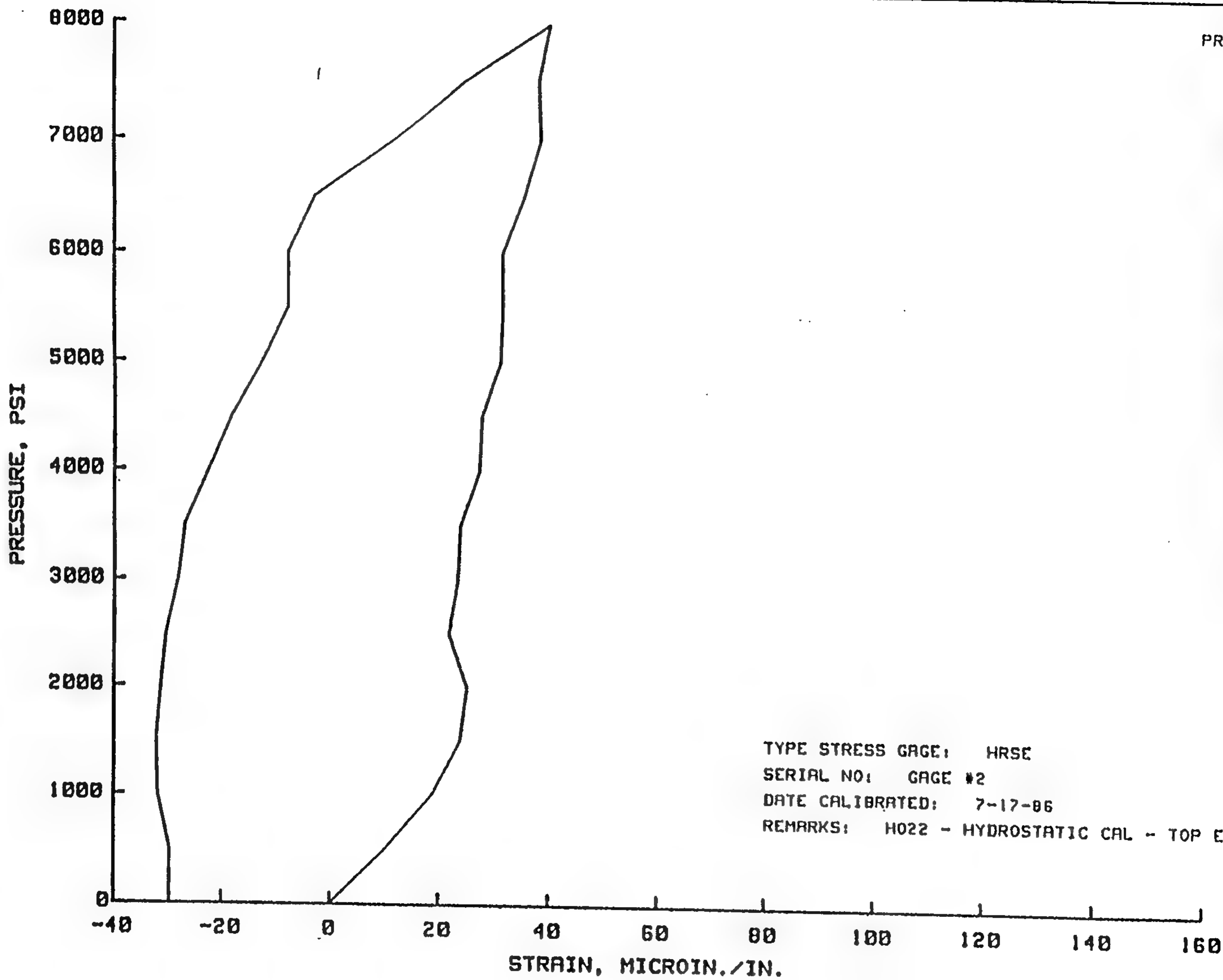


PRESSURE	STRAIN
0	0.0
500	33.5
1000	77.0
1500	121.7
2000	167.4
2500	214.3
3000	260.0
3500	304.0
4000	350.0
4500	393.9
5000	438.3
5500	485.7
6000	532.6
6500	576.1
7000	619.6
7500	669.6
8000	711.3
7500	670.4
7000	630.4
6500	589.1
6000	546.1
5500	500.4
5000	454.3
4500	410.0
4000	366.1
3500	321.7
3000	277.4
2500	233.0
2000	188.3
1500	143.0
1000	95.7
500	49.6
0	13.0



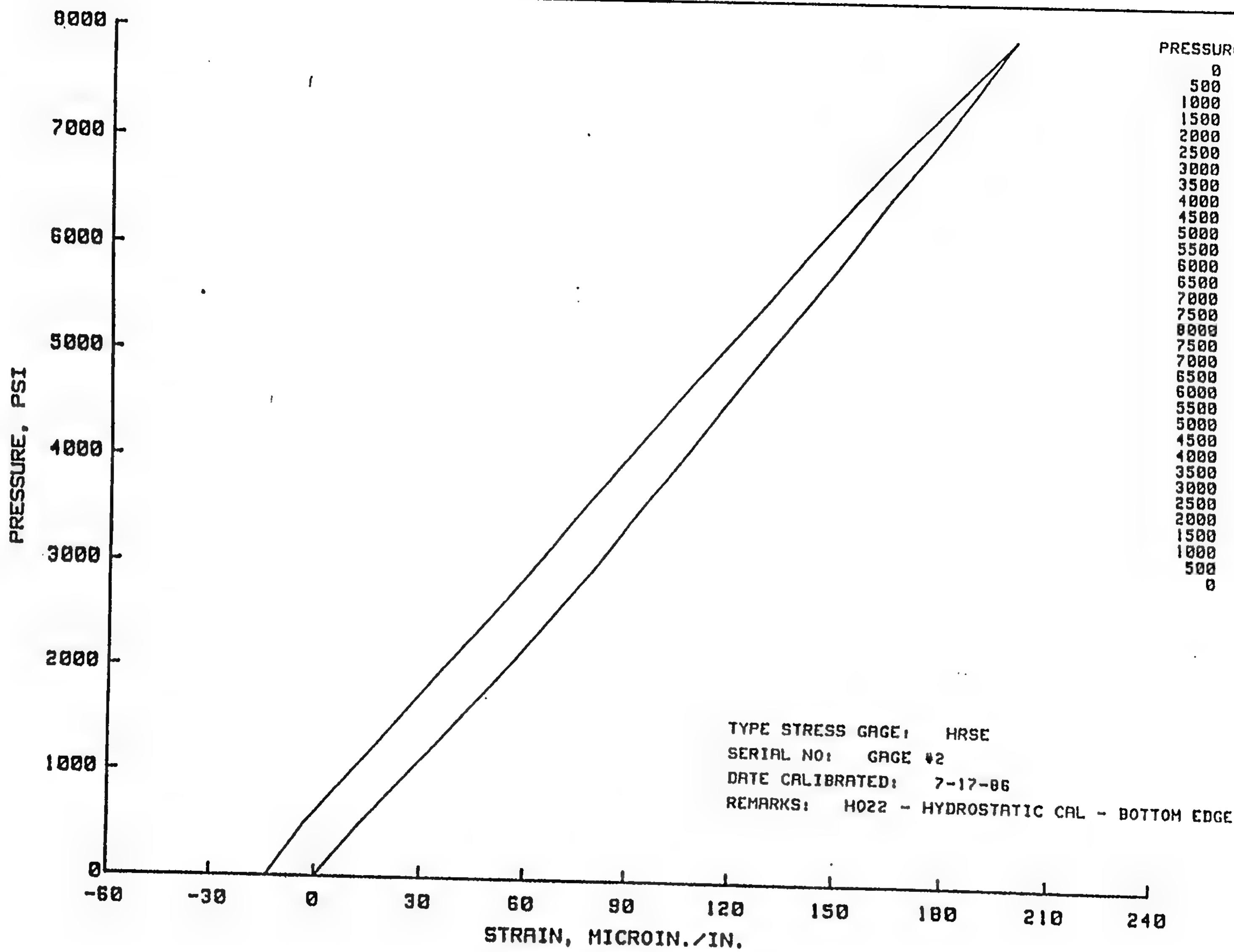
PRESSURE	STRAIN
0	0.0
500	39.1
1000	90.9
1500	147.0
2000	206.1
2500	265.2
3000	321.7
3500	379.1
4000	434.8
4500	491.3
5000	549.1
5500	606.1
6000	663.0
6500	721.7
7000	777.0
7500	852.2
8000	890.0
7500	850.4
7000	802.6
6500	753.9
6000	703.5
5500	651.3
5000	598.3
4500	543.5
4000	486.1
3500	429.6
3000	372.6
2500	314.3
2000	254.3
1500	193.5
1000	132.6
500	71.7
0	28.3

Plate 50



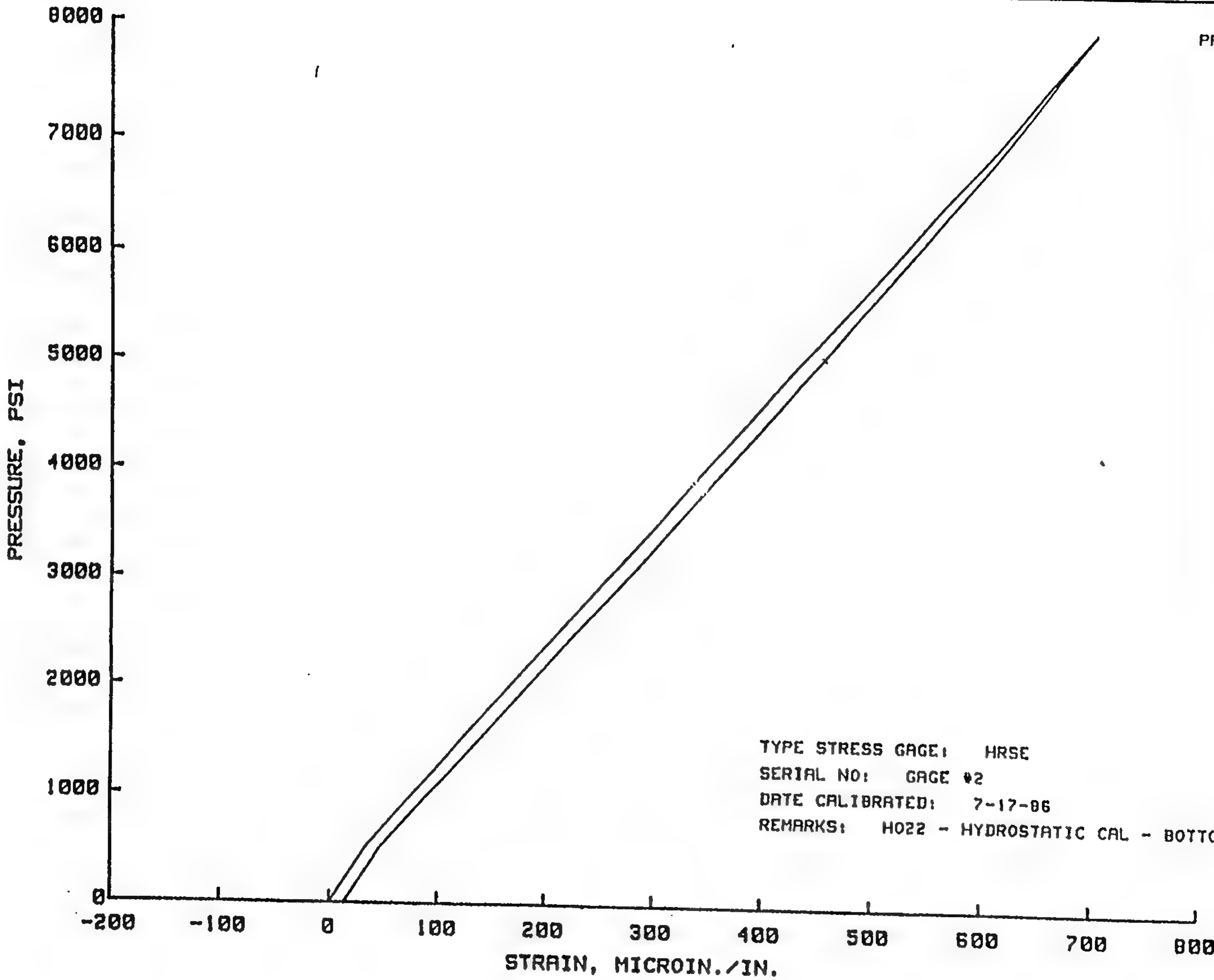
PRESSURE	STRAIN
0	0.0
500	10.0
1000	18.7
1500	23.9
2000	25.2
2500	21.7
3000	23.5
3500	23.9
4000	27.4
4500	27.8
5000	31.3
5500	31.7
6000	31.7
6500	35.7
7000	38.7
7500	38.3
8000	40.4
7500	24.8
7000	11.7
6500	-3.0
6000	-7.8
5500	-7.8
5000	-12.6
4500	-18.3
4000	-22.6
3500	-27.0
3000	-28.3
2500	-30.4
2000	-31.3
1500	-32.2
1000	-31.7
500	-29.6
0	-29.6

Plate 51



PRESSURE	STRAIN
0	0.0
500	12.6
1000	26.5
1500	40.4
2000	54.3
2500	67.4
3000	80.4
3500	92.6
4000	105.2
4500	117.0
5000	129.1
5500	141.3
6000	153.5
6500	164.8
7000	177.0
7500	188.7
8000	199.6
7500	184.8
7000	169.6
6500	155.7
6000	142.2
5500	129.1
5000	115.7
4500	102.2
4000	88.7
3500	75.7
3000	62.6
2500	49.6
2000	36.1
1500	23.0
1000	10.0
500	-3.0
0	-13.9

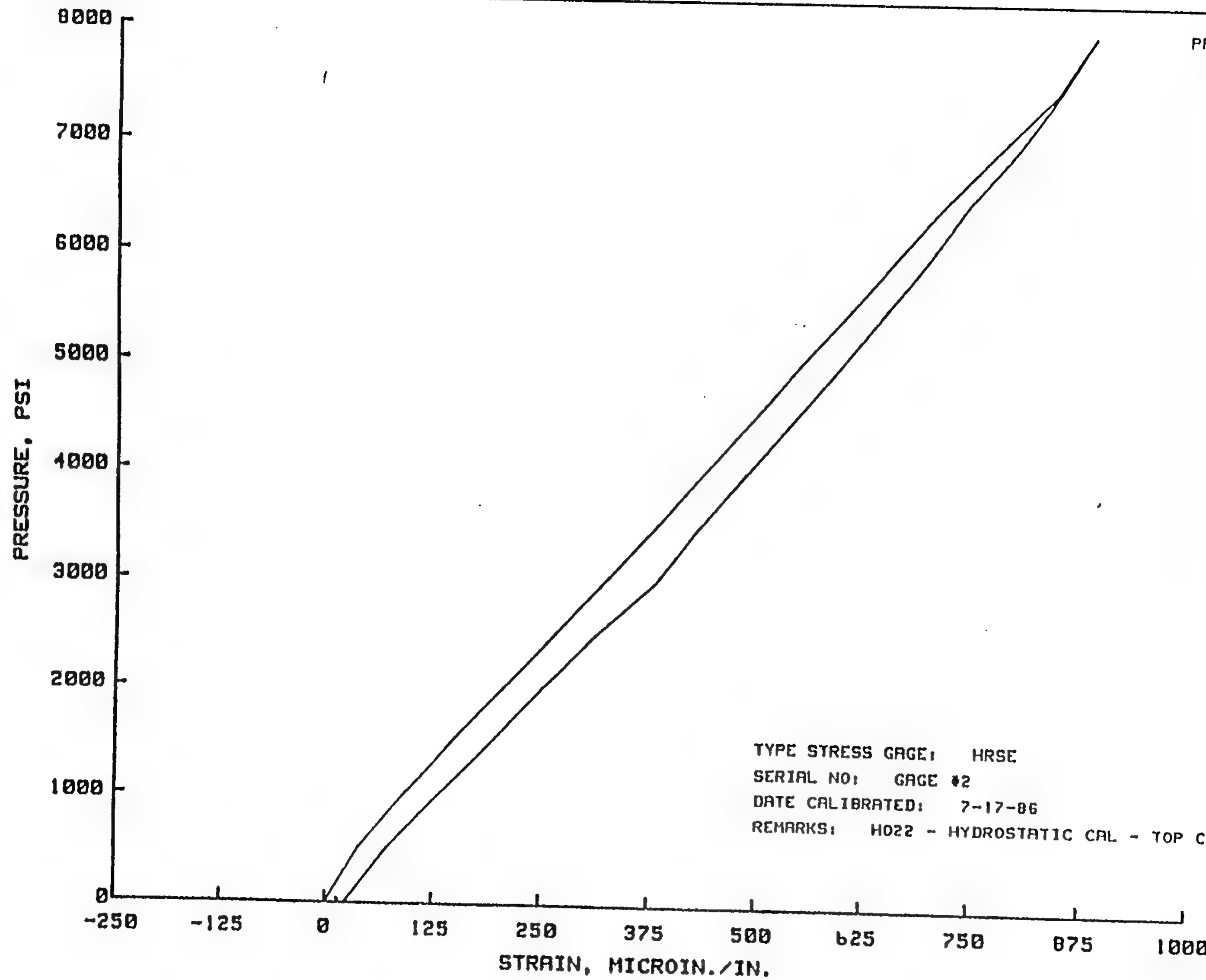
Plate 52



PRESSURE	STRAIN
0	0.0
500	33.0
1000	76.5
1500	121.3
2000	166.5
2500	211.7
3000	256.1
3500	302.2
4000	345.7
4500	390.9
5000	435.2
5500	480.9
6000	526.1
6500	570.4
7000	616.5
7500	660.9
8000	707.0
7500	664.8
7000	622.6
6500	580.9
6000	537.8
5500	493.9
5000	452.2
4500	407.8
4000	363.5
3500	318.7
3000	273.9
2500	227.0
2000	183.0
1500	137.8
1000	90.9
500	46.1
0	13.0

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H022 - HYDROSTATIC CAL - BOTTOM CENTER

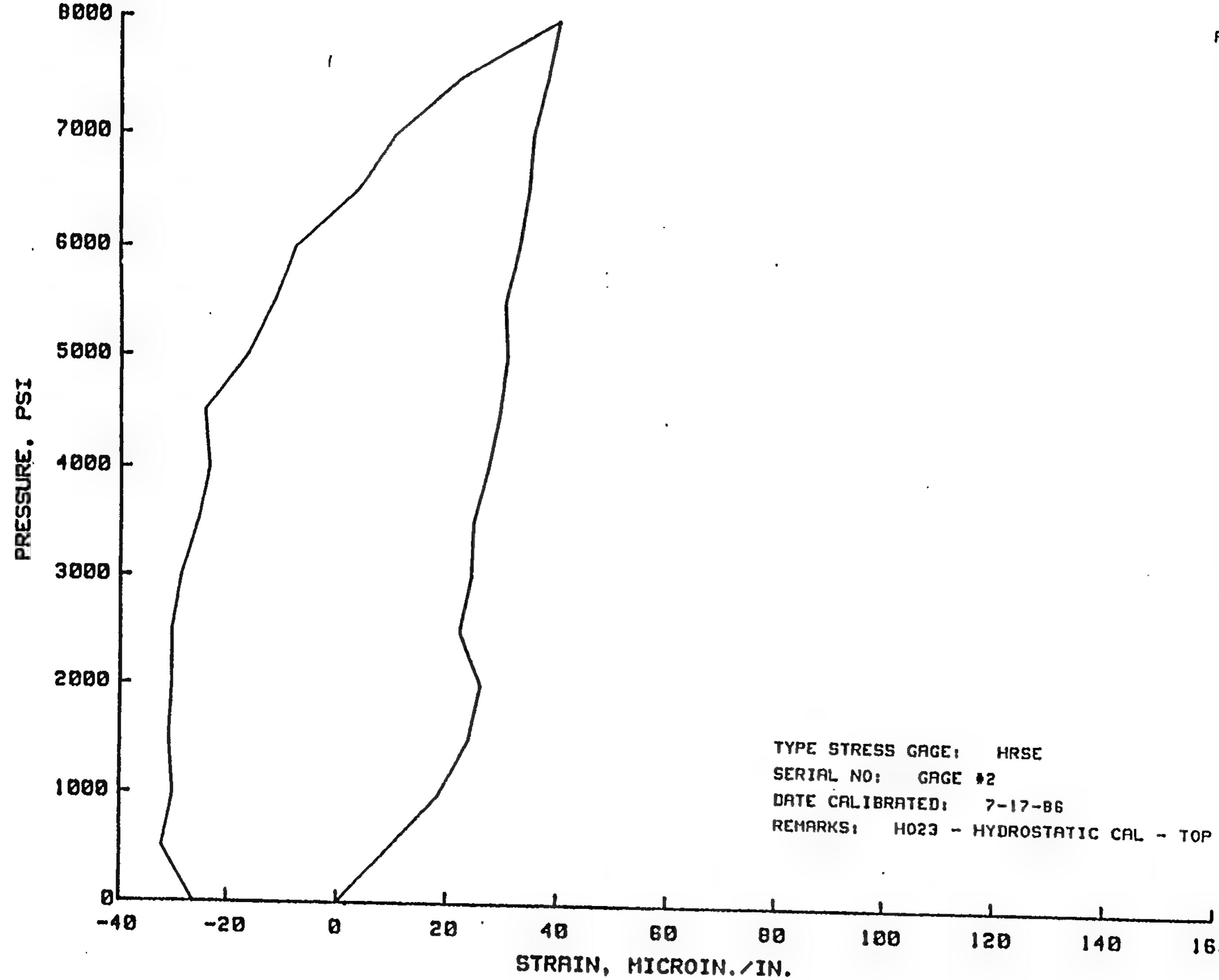
Plate 53



PRESSURE	STRAIN
0	0.0
500	37.8
1000	89.6
1500	145.7
2000	205.7
2500	264.3
3000	321.7
3500	379.6
4000	436.5
4500	493.9
5000	550.0
5500	608.7
6000	665.2
6500	721.7
7000	782.6
7500	847.8
8000	890.9
7500	850.0
7000	802.6
6500	747.8
6000	702.6
5500	650.4
5000	597.8
4500	542.2
4000	485.7
3500	429.6
3000	380.0
2500	311.3
2000	250.0
1500	191.3
1000	129.1
500	70.4
0	21.7

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H022 - HYDROSTATIC CAL - TOP CENTER

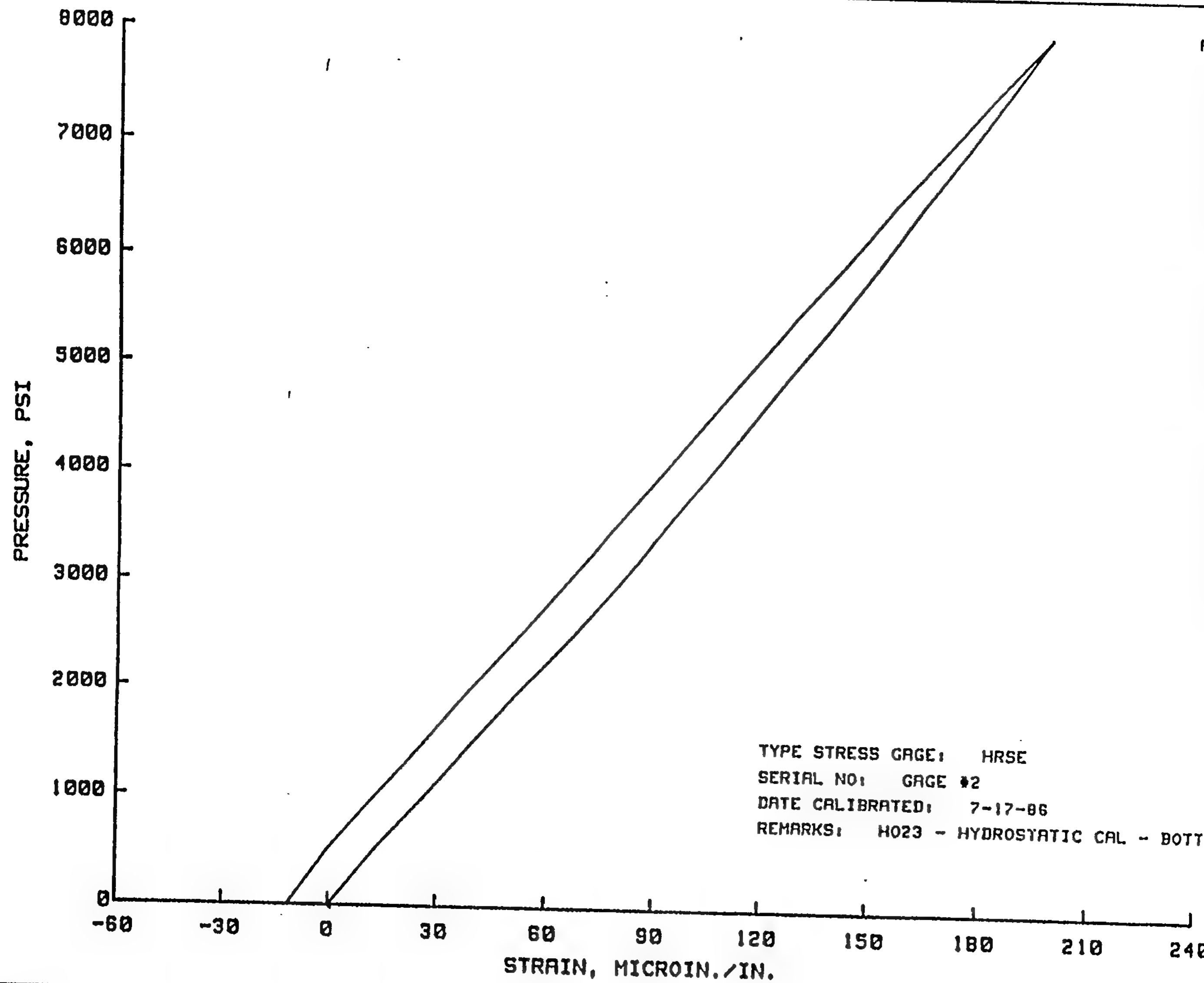
Plate 54



PRESSURE	STRAIN
0	0.0
500	9.6
1000	18.7
1500	23.9
2000	26.1
2500	22.2
3000	24.3
3500	24.8
4000	27.4
4500	29.6
5000	30.9
5500	30.4
6000	33.0
6500	34.8
7000	35.7
7500	38.3
8000	40.4
7500	22.6
7000	10.4
6500	3.5
6000	-7.8
5500	-11.7
5000	-16.5
4500	-24.3
4000	-23.5
3500	-25.7
3000	-28.7
2500	-30.4
2000	-30.4
1500	-30.9
1000	-30.0
500	-32.2
0	-26.1

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H023 - HYDROSTATIC CAL - TOP EDGE

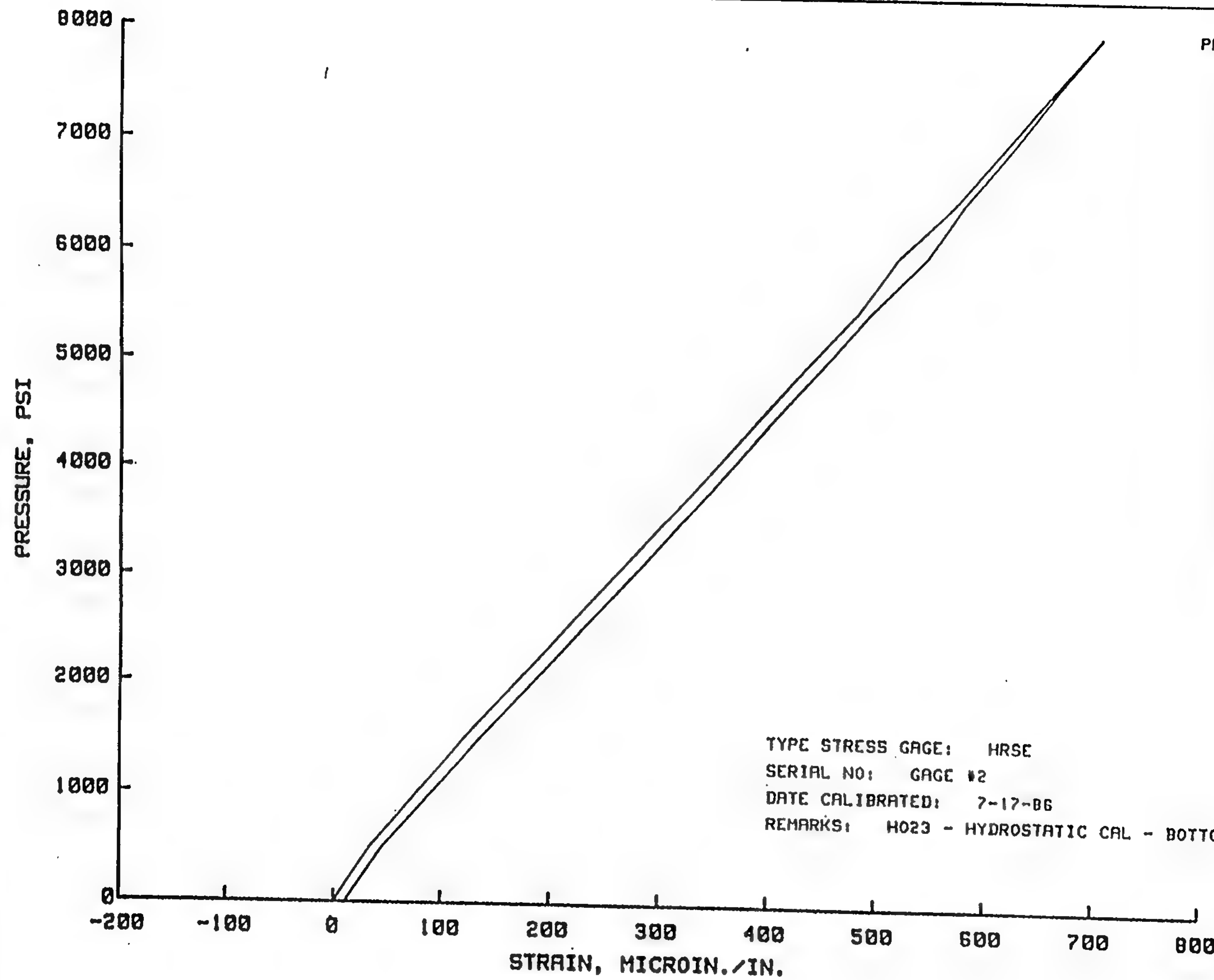
Plate 55



PRESSURE	STRAIN
0	0.0
500	12.6
1000	26.5
1500	39.6
2000	53.0
2500	67.0
3000	80.0
3500	92.6
4000	105.2
4500	117.4
5000	129.6
5500	141.7
6000	153.5
6500	164.8
7000	177.0
7500	188.3
8000	199.6
7500	184.8
7000	171.3
6500	157.0
6000	143.9
5500	130.0
5000	117.4
4500	104.3
4000	91.3
3500	78.3
3000	65.2
2500	52.2
2000	39.1
1500	26.1
1000	12.6
500	-.4
0	-11.7

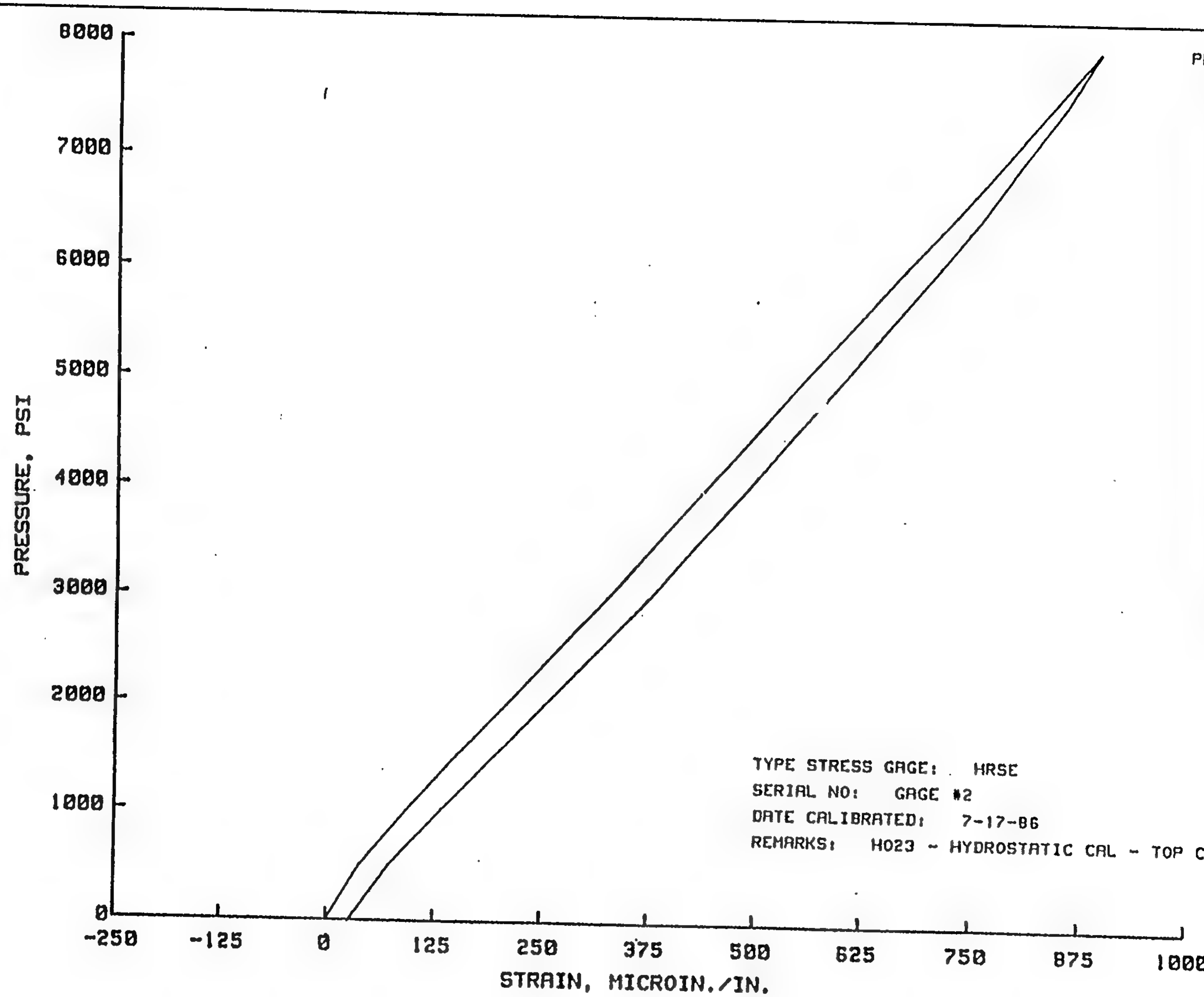
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H023 - HYDROSTATIC CAL - BOTTOM EDGE

Plate 56



PRESSURE	STRAIN
0	0.0
500	33.5
1000	77.0
1500	121.7
2000	167.4
2500	212.2
3000	257.4
3500	302.6
4000	348.3
4500	393.0
5000	438.3
5500	485.2
6000	521.7
6500	574.3
7000	619.1
7500	664.0
8000	709.6
7500	667.8
7000	626.1
6500	582.2
6000	547.4
5500	496.5
5000	452.6
4500	406.5
4000	362.6
3500	317.8
3000	273.0
2500	227.4
2000	182.2
1500	136.1
1000	90.0
500	44.0
0	10.0

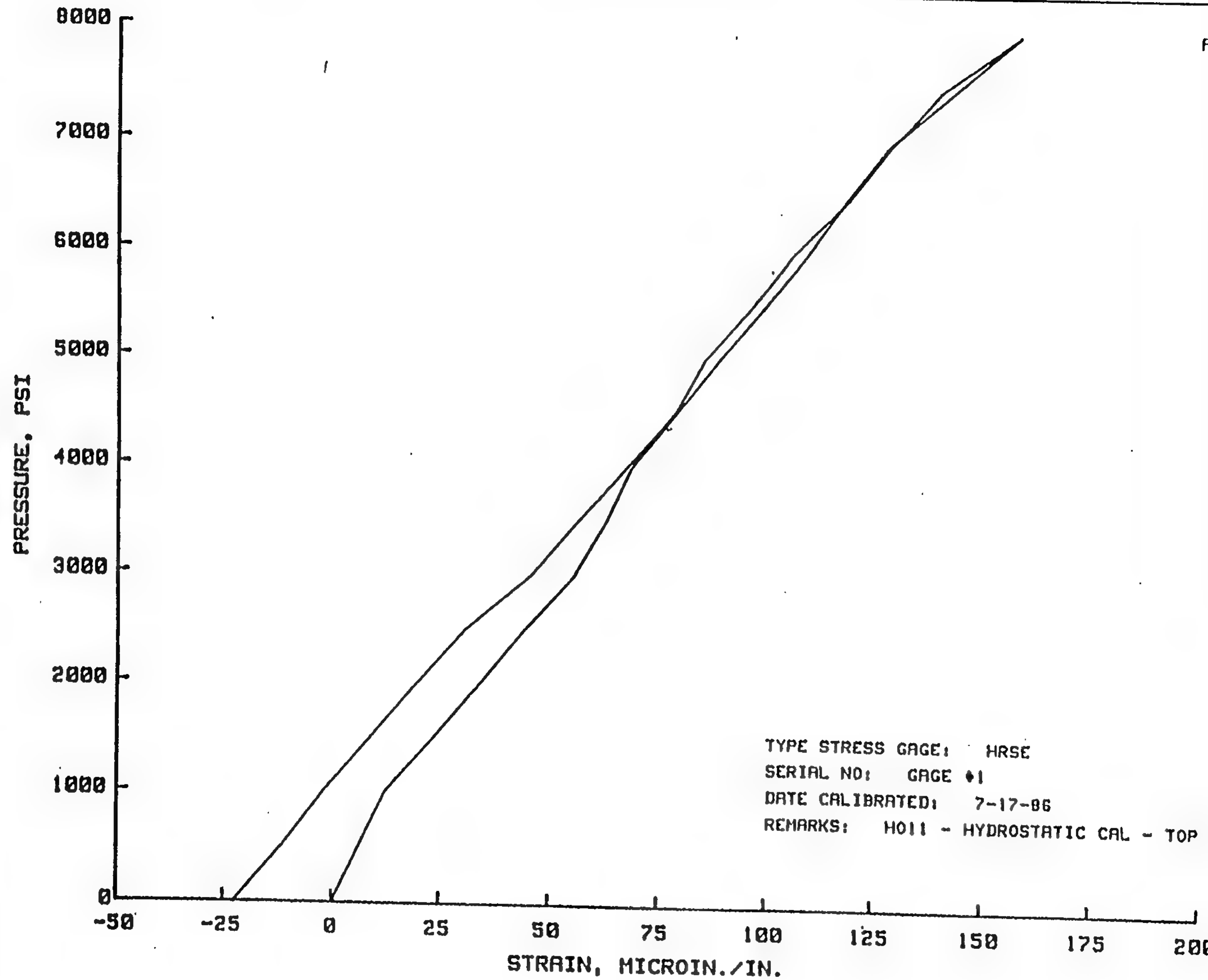
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H023 - HYDROSTATIC CAL - BOTTOM CENTER



PRESSURE	STRAIN
0	0.0
500	38.3
1000	91.7
1500	149.1
2000	209.1
2500	267.4
3000	325.7
3500	382.6
4000	439.1
4500	496.5
5000	553.5
5500	611.3
6000	669.1
6500	727.4
7000	782.6
7500	840.0
8000	895.7
7500	854.3
7000	803.5
6500	757.8
6000	706.5
5500	652.2
5000	599.1
4500	542.2
4000	487.0
3500	430.4
3000	373.9
2500	314.3
2000	253.5
1500	192.6
1000	131.3
500	71.7
0	25.7

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #2
DATE CALIBRATED: 7-17-86
REMARKS: H023 - HYDROSTATIC CAL - TOP CENTER

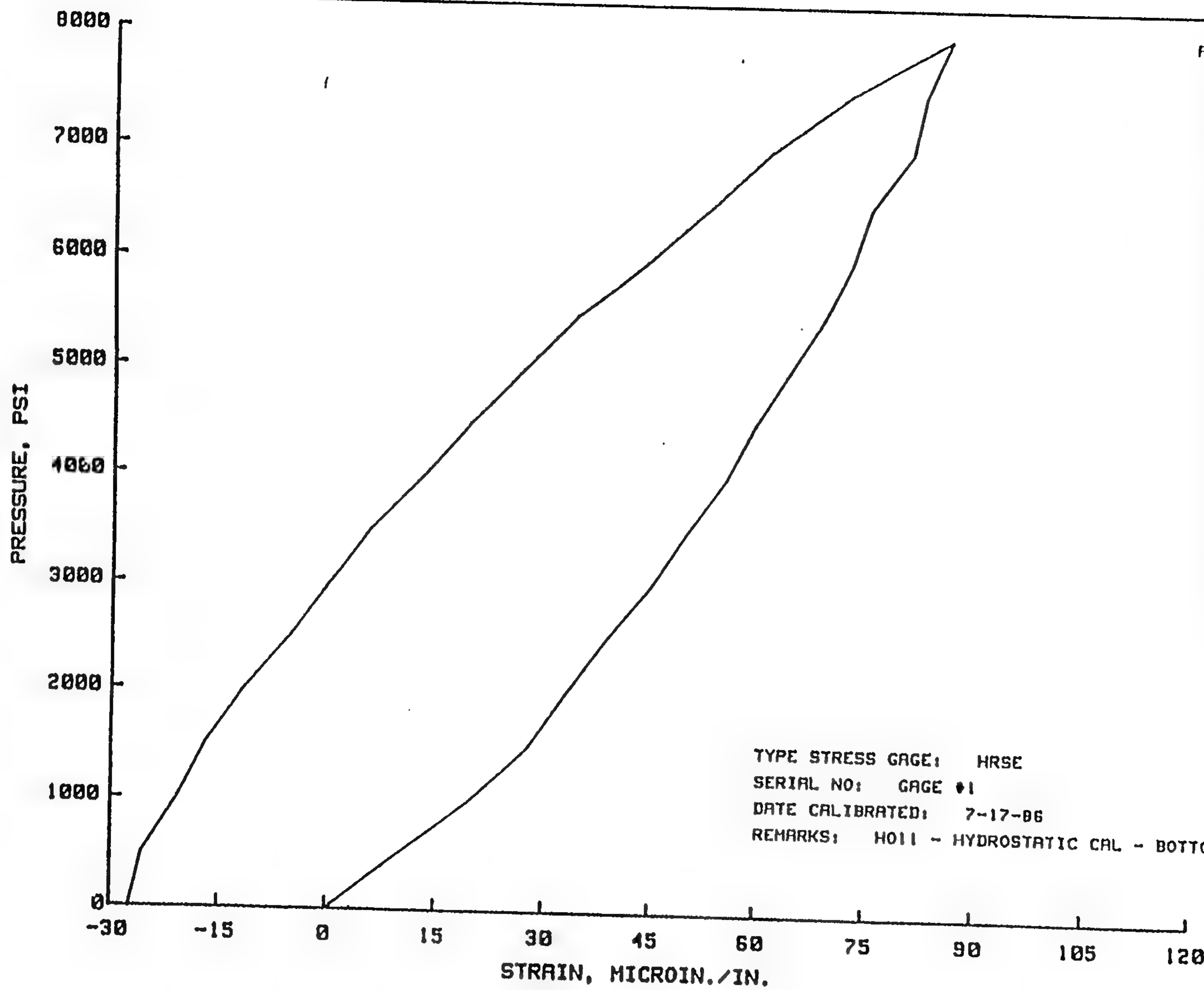
Plate 58



PRESSURE	STRAIN
0	0.0
500	6.1
1000	12.2
1500	29.5
2000	34.3
2500	44.3
3000	55.7
3500	63.0
4000	68.7
4500	79.1
5000	89.1
5500	99.6
6000	110.0
6500	119.1
7000	128.7
7500	143.9
8000	159.1
7500	140.9
7000	129.1
6500	119.6
6000	106.5
5500	96.5
5000	85.7
4500	78.7
4000	67.4
3500	56.5
3000	45.7
2500	30.9
2000	19.6
1500	8.7
1000	-2.2
500	-11.7
0	-22.6

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: H011 - HYDROSTATIC CAL - TOP EDGE

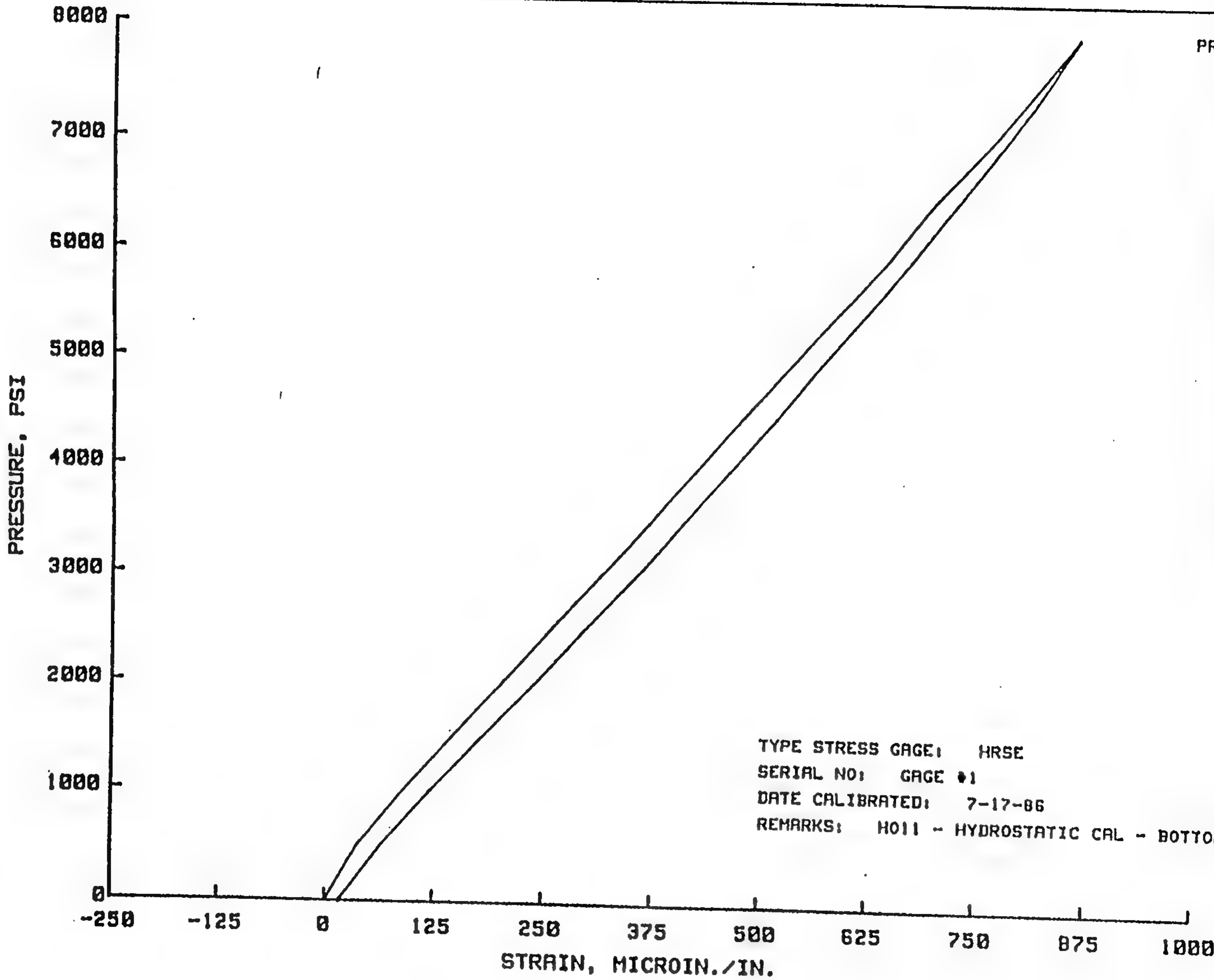
Plate 59



PRESSURE	STRAIN
0	0.0
500	9.6
1000	19.6
1500	27.8
2000	33.0
2500	38.7
3000	44.8
3500	50.0
4000	55.7
4500	59.6
5000	64.3
5500	69.1
6000	73.0
6500	75.7
7000	81.3
7500	83.0
8000	86.5
7500	72.6
7000	61.7
6500	53.5
6000	44.3
5500	34.3
5000	27.0
4500	19.6
4000	13.0
3500	5.7
3000	0.0
2500	-5.2
2000	-11.7
1500	-17.0
1000	-20.9
500	-25.7
0	-27.4

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: HO11 - HYDROSTATIC CAL - BOTTOM EDGE

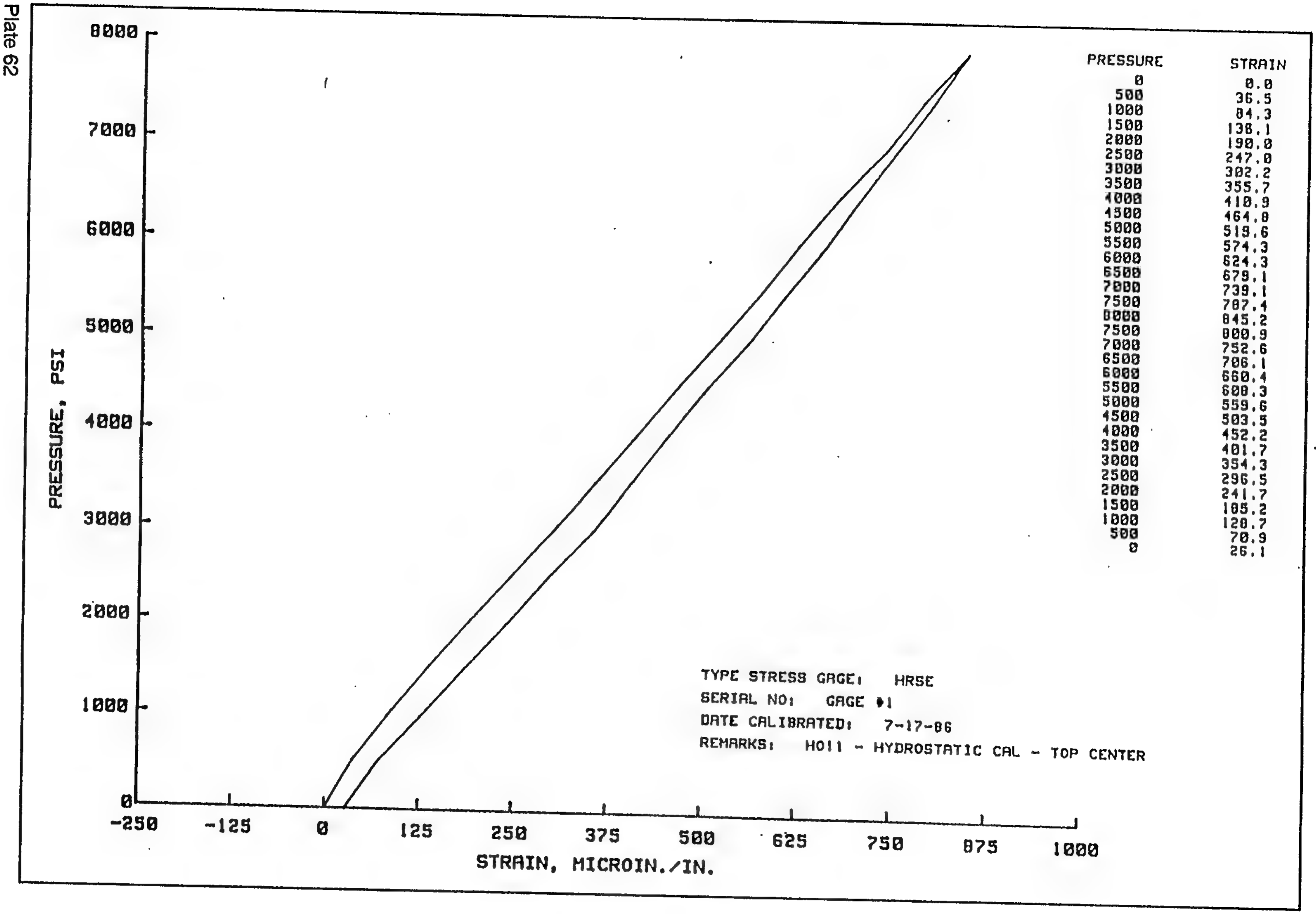
Plate 60



PRESSURE	STRAIN
0	0.0
500	37.0
1000	89.1
1500	145.2
2000	201.3
2500	256.5
3000	313.5
3500	370.4
4000	425.7
4500	480.9
5000	537.4
5500	593.5
6000	651.7
6500	702.6
7000	760.9
7500	815.2
8000	867.8
7500	824.8
7000	777.0
6500	728.3
6000	678.3
5500	625.2
5000	570.9
4500	519.1
4000	464.3
3500	409.6
3000	353.5
2500	294.3
2000	237.8
1500	179.1
1000	120.0
500	63.5
0	15.2

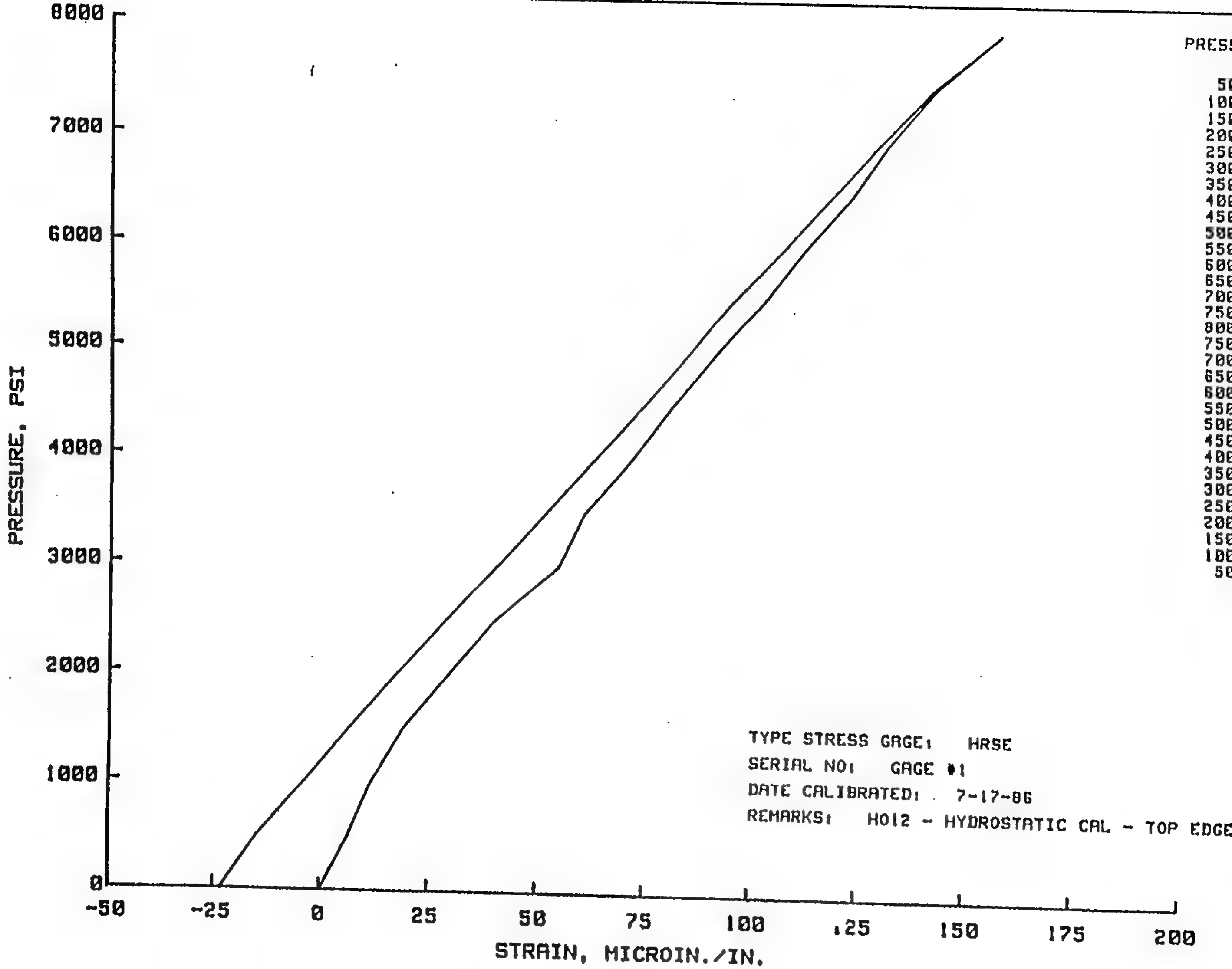
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: H011 - HYDROSTATIC CAL - BOTTOM CENTER

Plate 61



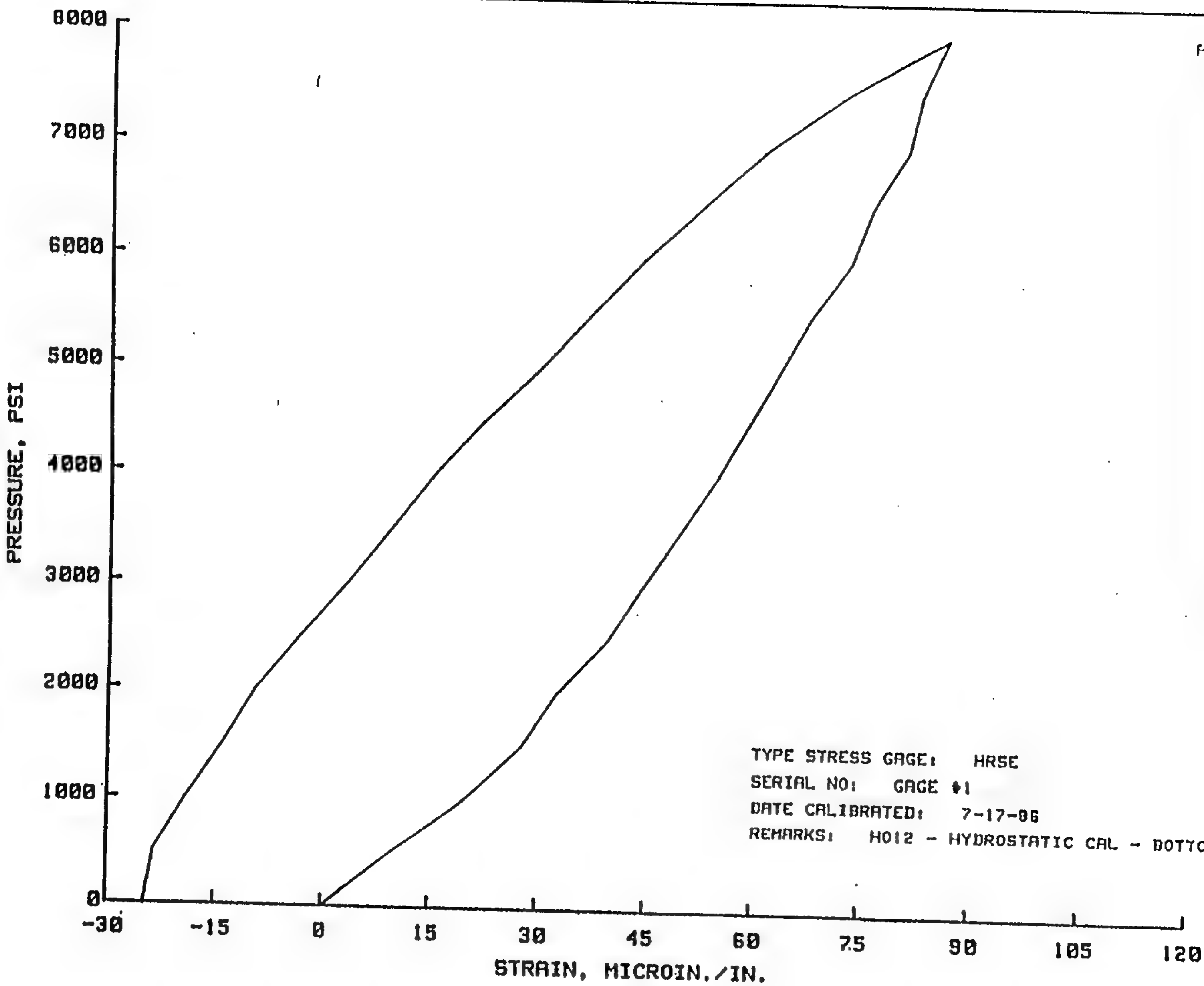
PRESSURE	STRAIN
0	0.0
500	36.5
1000	84.3
1500	138.1
2000	190.0
2500	247.0
3000	302.2
3500	355.7
4000	410.9
4500	464.0
5000	519.6
5500	574.3
6000	624.3
6500	679.1
7000	739.1
7500	787.4
8000	845.2
7500	800.9
7000	752.6
6500	706.1
6000	660.4
5500	608.3
5000	559.6
4500	503.5
4000	452.2
3500	401.7
3000	354.3
2500	296.5
2000	241.7
1500	185.2
1000	128.7
500	70.9
0	26.1

Plate 62



PRESSURE	STRAIN
0	0.0
500	6.5
1000	11.7
1500	19.1
2000	29.6
2500	40.0
3000	54.8
3500	60.9
4000	71.7
4500	81.3
5000	91.7
5500	103.0
6000	112.6
6500	123.5
7000	132.2
7500	143.0
8000	150.3
7500	142.2
7000	130.0
6500	118.7
6000	107.4
5500	95.7
5000	85.2
4500	74.3
4000	63.0
3500	51.7
3000	40.4
2500	28.7
2000	17.4
1500	6.5
1000	-3.9
500	-14.8
0	-23.5

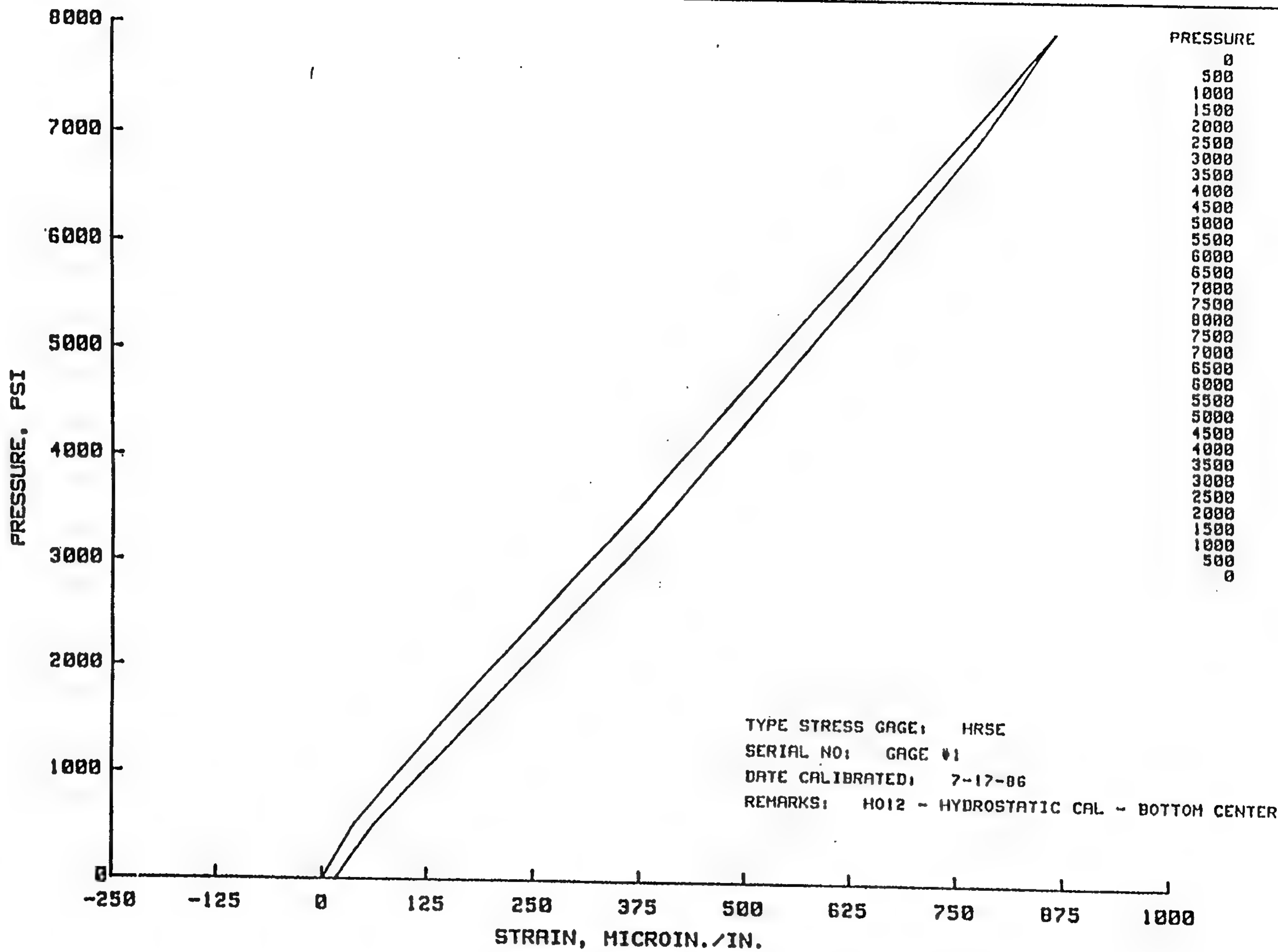
Plate 63



PRESSURE	STRAIN
0	0.0
500	9.6
1000	19.6
1500	27.0
2000	32.6
2500	39.6
3000	44.3
3500	49.6
4000	54.0
4500	59.1
5000	63.5
5500	67.8
6000	73.5
6500	76.5
7000	81.3
7500	83.0
8000	86.5
7500	73.0
7000	61.7
6500	53.0
6000	44.3
5500	37.0
5000	30.0
4500	22.2
4000	15.2
3500	9.1
3000	3.0
2500	-3.5
2000	-9.6
1500	-13.9
1000	-19.1
500	-23.5
0	-24.8

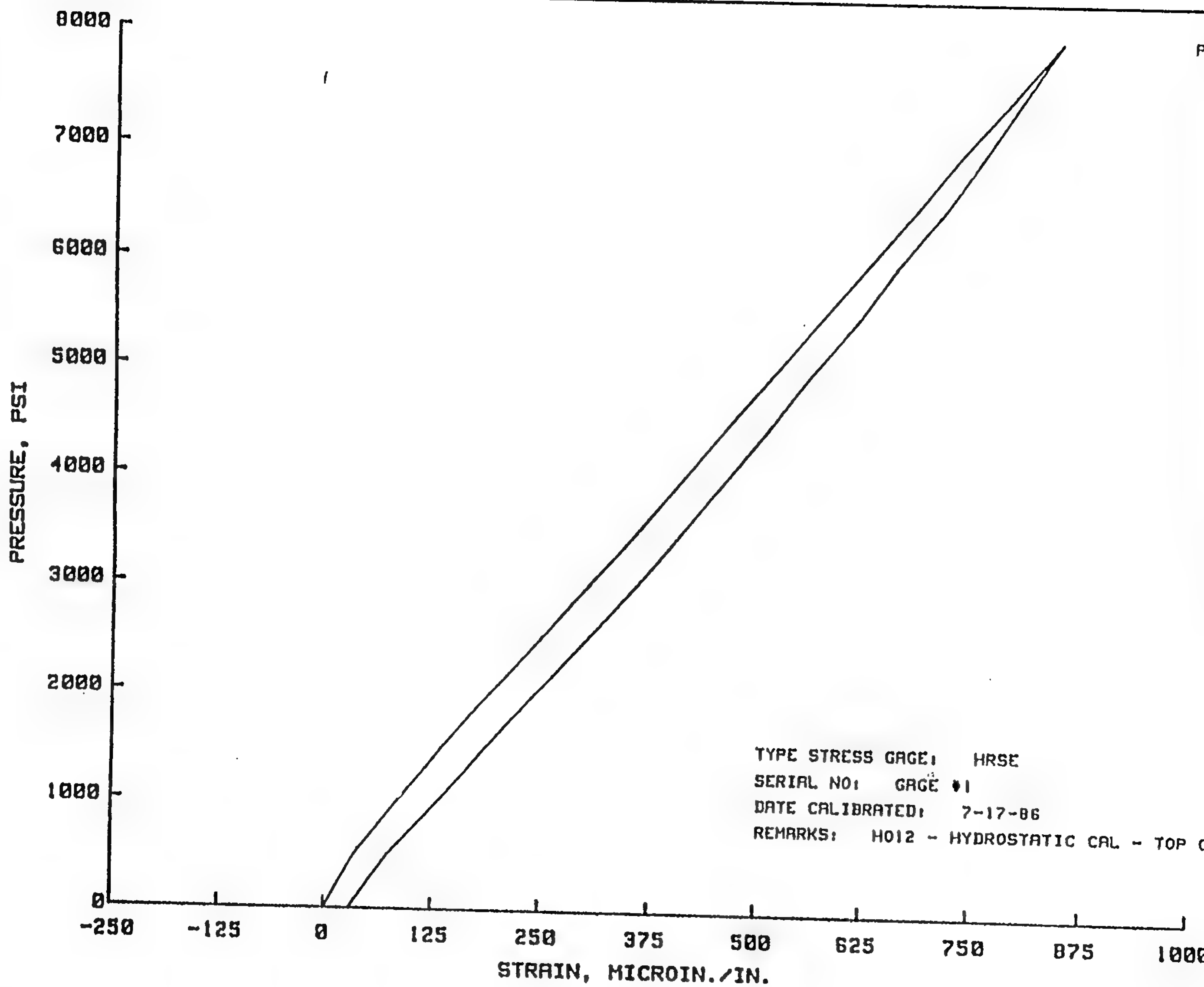
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: HO12 - HYDROSTATIC CAL - BOTTOM EDGE

Plate 64



PRESSURE	STRAIN
0	0.0
500	37.4
1000	90.4
1500	145.7
2000	201.3
2500	257.8
3000	313.5
3500	370.0
4000	425.2
4500	481.3
5000	537.4
5500	593.0
6000	649.6
6500	704.3
7000	758.7
7500	814.8
8000	868.3
7500	824.3
7000	778.3
6500	727.0
6000	677.0
5500	624.3
5000	570.9
4500	516.5
4000	462.6
3500	408.7
3000	353.5
2500	294.3
2000	237.0
1500	179.1
1000	118.7
500	60.9
0	15.2

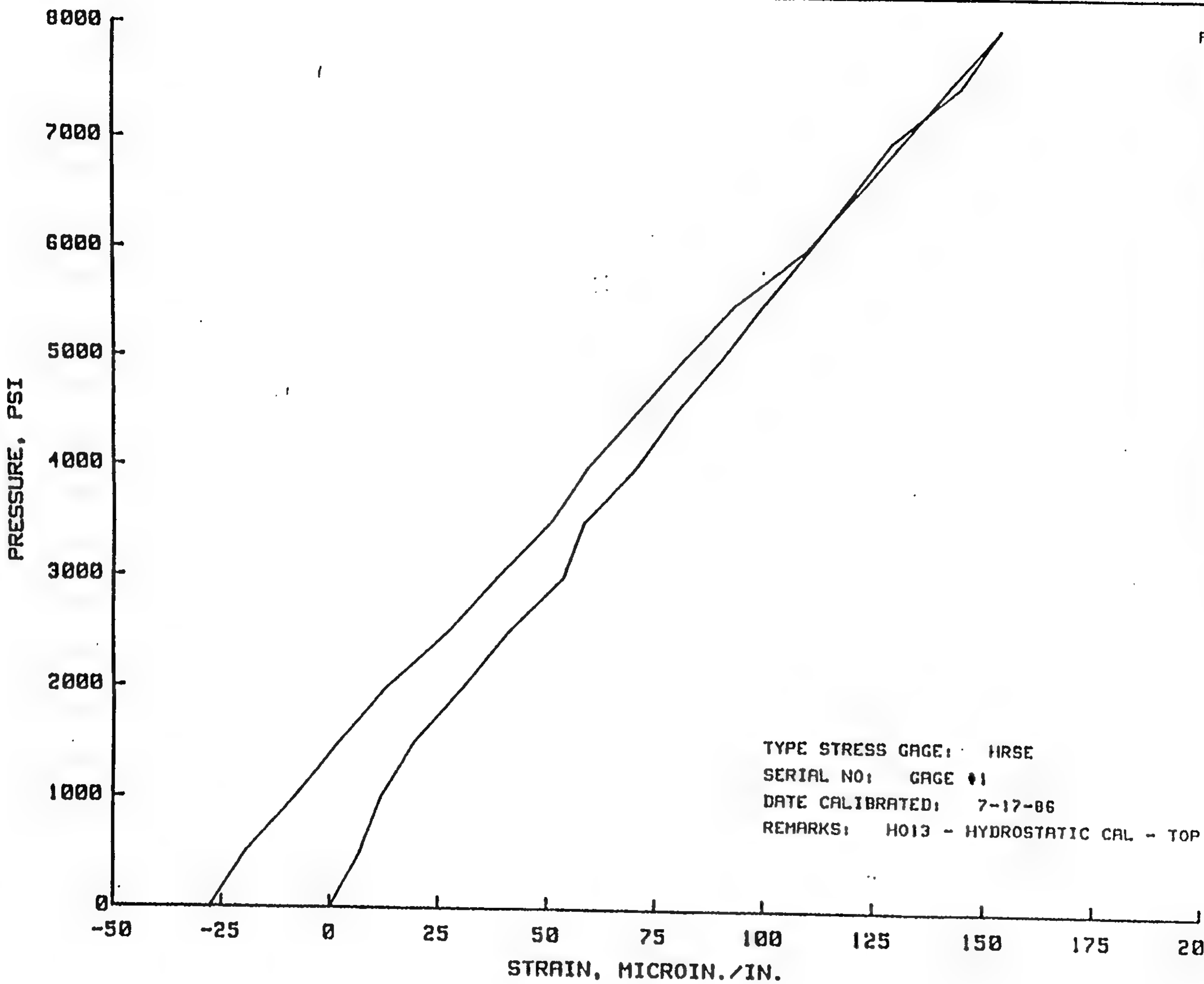
Plate 65



PRESSURE	STRAIN
0	0.0
500	35.7
1000	85.2
1500	137.4
2000	191.7
2500	240.3
3000	303.5
3500	357.0
4000	412.2
4500	465.7
5000	521.3
5500	576.1
6000	630.4
6500	687.0
7000	737.0
7500	794.8
8000	850.0
7500	805.7
7000	762.2
6500	710.7
6000	665.2
5500	619.1
5000	565.2
4500	515.7
4000	462.6
3500	408.7
3000	356.1
2500	300.9
2000	243.5
1500	187.4
1000	131.7
500	73.5
0	28.3

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: H012 - HYDROSTATIC CAL - TOP CENTER

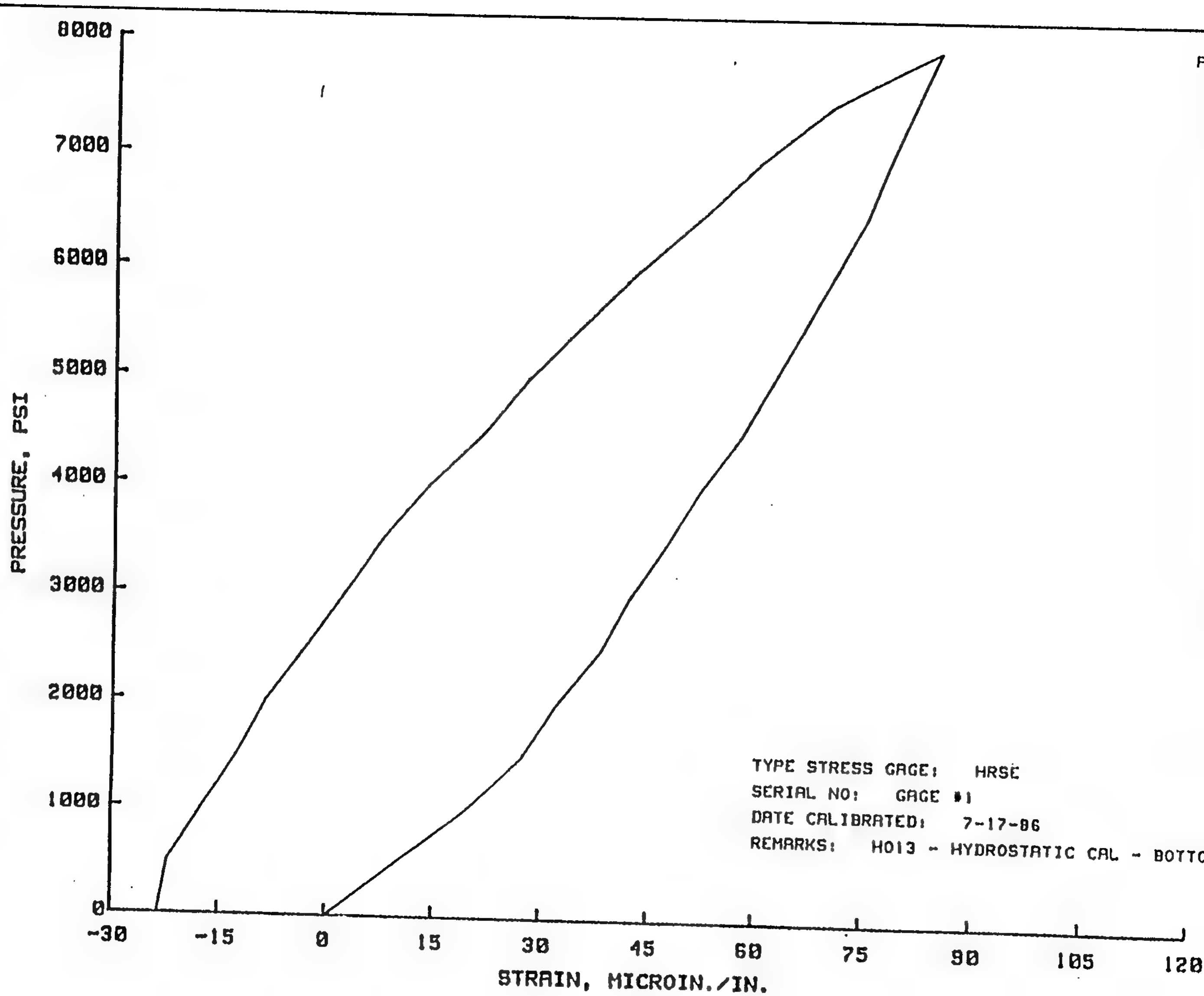
Plate 66



PRESSURE	STRAIN
0	0.0
500	7.0
1000	11.7
1500	19.6
2000	30.9
2500	41.3
3000	53.9
3500	58.7
4000	70.9
4500	80.0
5000	90.9
5500	100.4
6000	110.9
6500	120.4
7000	130.0
7500	145.7
8000	154.8
7500	143.0
7000	132.2
6500	121.3
6000	110.0
5500	93.9
5000	82.2
4500	70.5
4000	59.6
3500	50.9
3000	38.7
2500	27.4
2000	13.0
1500	2.2
1000	-8.3
500	-19.6
0	-27.8

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: HO13 - HYDROSTATIC CAL - TOP EDGE

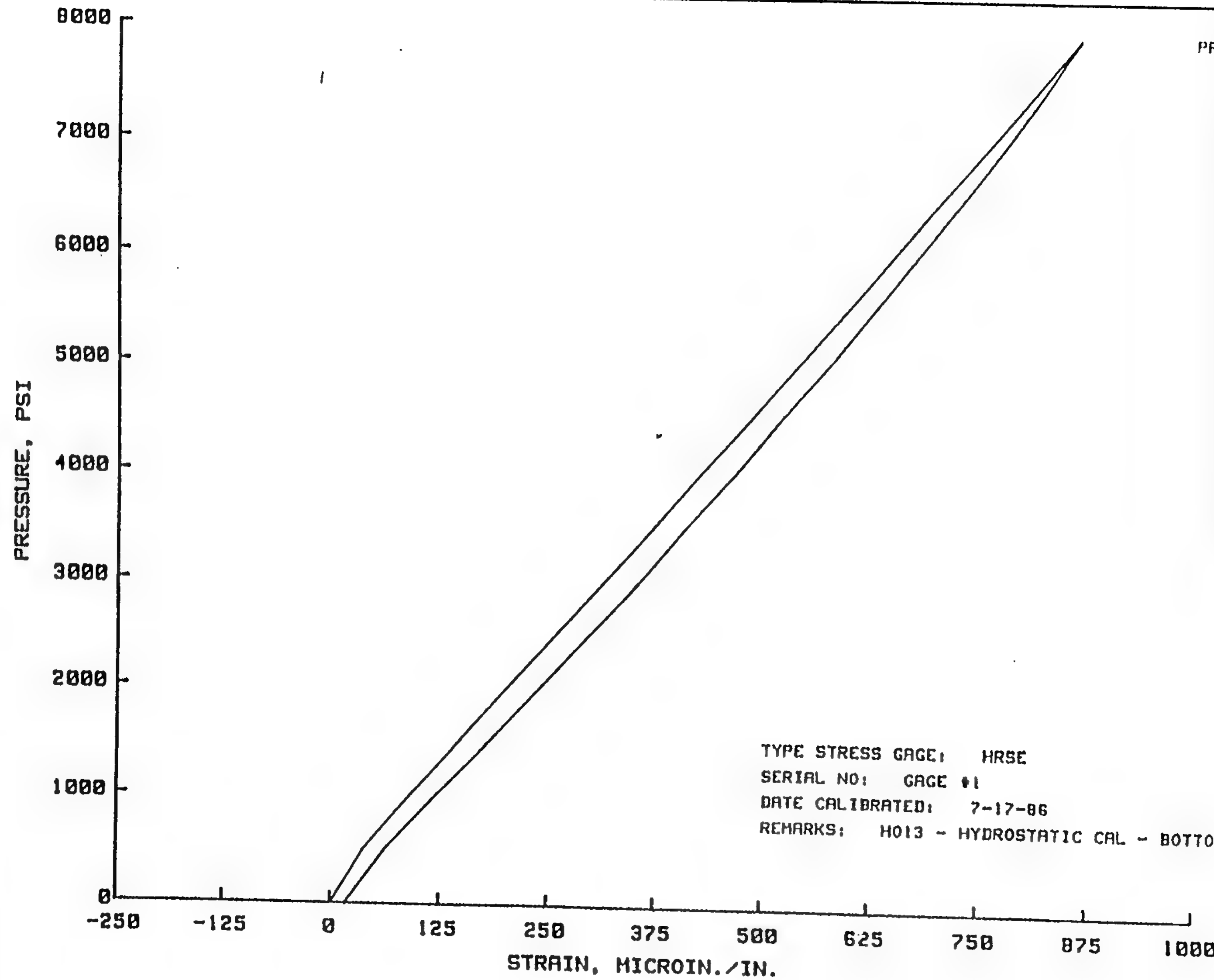
Plate 67



PRESSURE	STRAIN
0	0.0
500	9.6
1000	19.6
1500	27.4
2000	32.2
2500	38.3
3000	42.2
3500	47.4
4000	52.2
4500	57.8
5000	62.2
5500	66.5
6000	70.9
6500	75.2
7000	78.3
7500	81.7
8000	85.2
7500	78.4
7000	68.4
6500	52.2
6000	43.0
5500	35.2
5000	27.8
4500	21.7
4000	13.9
3500	7.4
3000	2.2
2500	-3.0
2000	-8.7
1500	-12.6
1000	-17.4
500	-22.2
0	-23.5

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: H013 - HYDROSTATIC CAL - BOTTOM EDGE

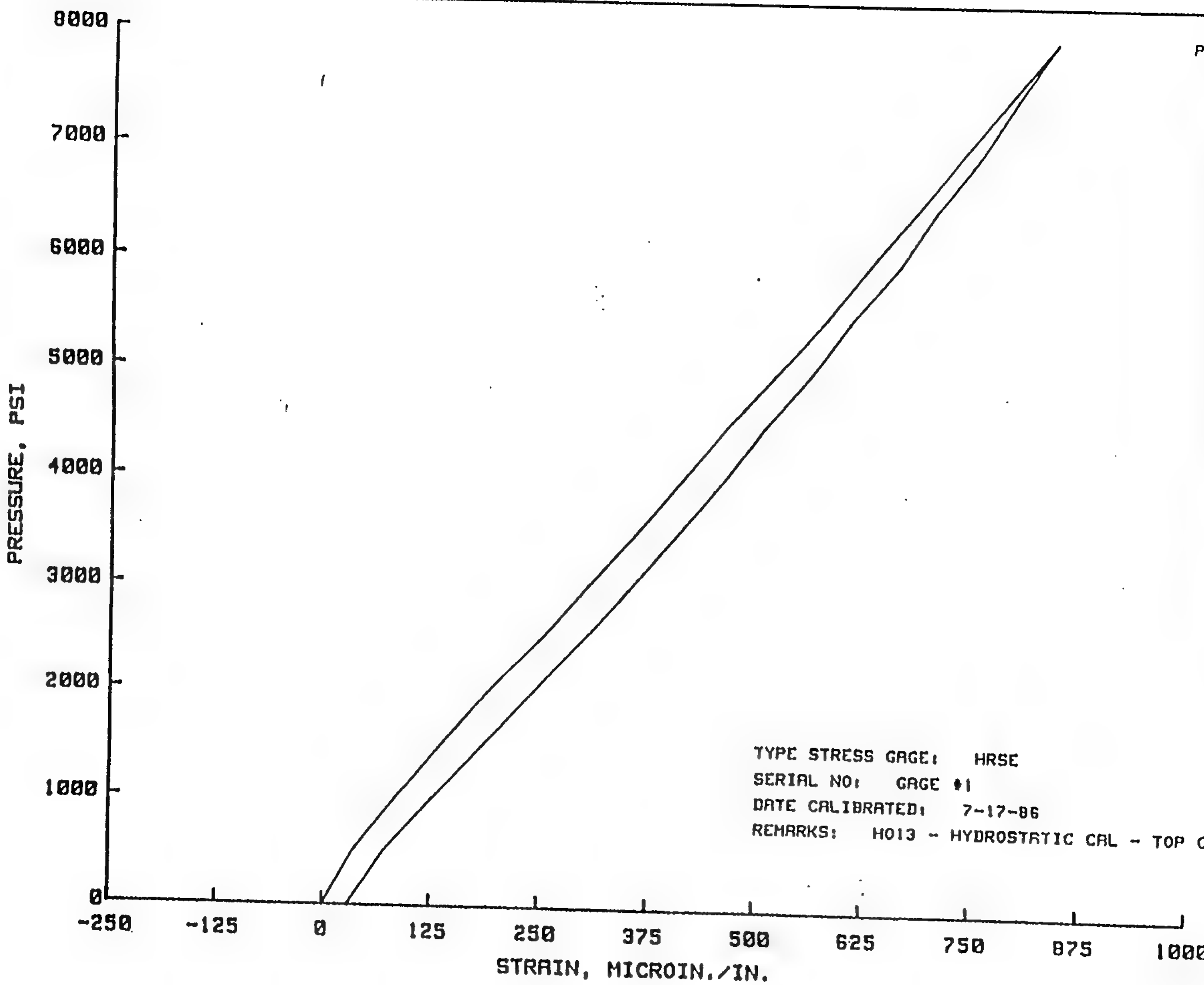
Plate 68



PRESSURE	STRAIN
0	0.0
500	37.0
1000	90.9
1500	146.1
2000	201.3
2500	257.4
3000	313.0
3500	370.4
4000	425.7
4500	482.6
5000	537.8
5500	593.9
6000	648.3
6500	703.0
7000	758.3
7500	813.9
8000	867.4
7500	823.9
7000	776.1
6500	727.8
6000	676.1
5500	624.3
5000	573.0
4500	517.0
4000	464.0
3500	407.8
3000	353.0
2500	296.1
2000	238.3
1500	180.0
1000	119.6
500	61.7
0	15.7

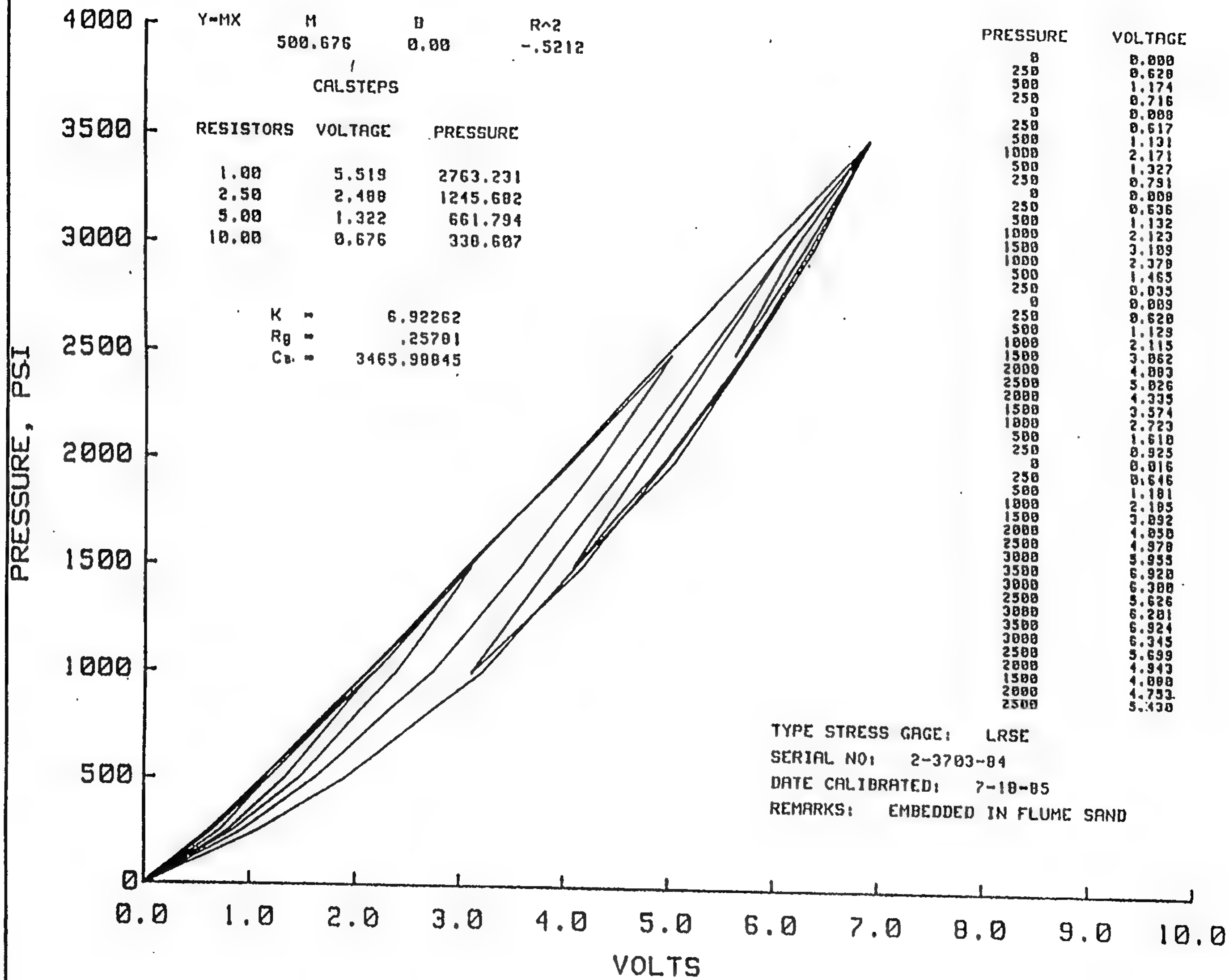
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE #1
DATE CALIBRATED: 7-17-86
REMARKS: H013 - HYDROSTATIC CAL - BOTTOM CENTER

Plate 69



PRESSURE	STRAIN
0	0.0
500	35.2
1000	83.9
1500	136.5
2000	190.9
2500	249.1
3000	302.6
3500	359.1
4000	412.6
4500	465.2
5000	524.3
5500	581.3
6000	632.2
6500	686.5
7000	738.3
7500	792.6
8000	846.5
7500	881.3
7000	758.7
6500	708.3
6000	666.5
5500	610.9
5000	564.3
4500	508.7
4000	460.0
3500	407.0
3000	351.7
2500	297.4
2000	241.7
1500	184.8
1000	126.5
500	70.4
0	28.3

Plate 70



Y=MX	M	B	R^2
	500.676	0.00	-.5212

/
CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.519	2763.231
2.50	2.488	1245.682
5.00	1.322	661.794
10.00	0.676	330.607

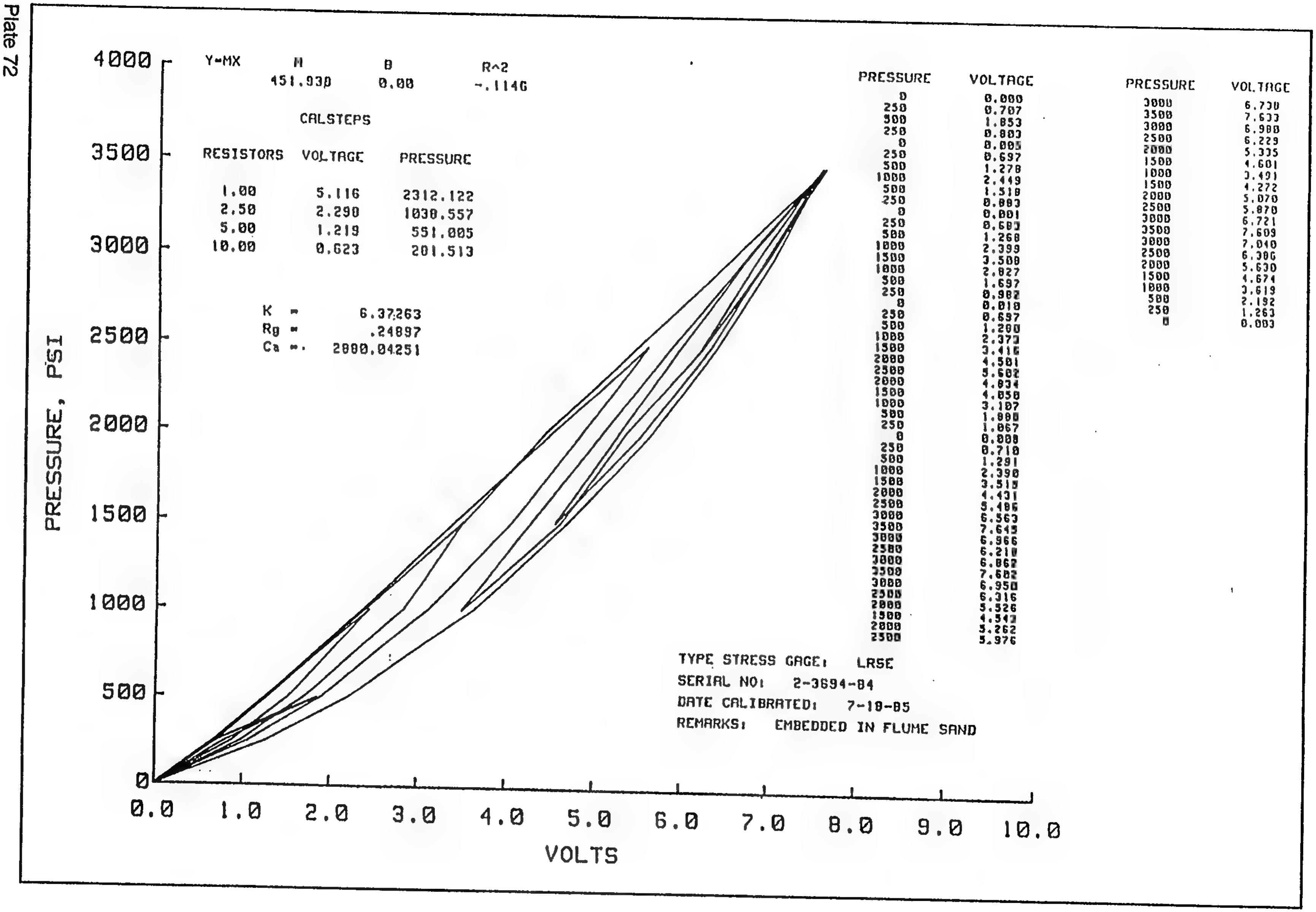
K = 6.92262
Rg = .25781
Cb = 3465.98845

PRESSURE	VOLTAGE
0	0.000
250	0.620
500	1.174
250	0.716
0	0.008
250	0.617
500	1.131
1000	2.171
500	1.327
250	0.791
0	0.000
250	0.636
500	1.132
1000	2.123
1500	3.109
1000	2.370
500	1.465
250	0.035
0	0.009
250	0.620
500	1.129
1000	2.115
1500	3.062
2000	4.003
2500	5.026
2000	4.335
1500	3.574
1000	2.723
500	1.610
250	0.925
0	0.016
250	0.646
500	1.181
1000	2.185
1500	3.092
2000	4.050
2500	4.970
3000	5.955
3500	6.920
3000	6.300
2500	5.626
3000	6.201
3500	6.924
3000	6.345
2500	5.699
2000	4.943
1500	4.000
2000	4.753
2500	5.430

PRESSURE	VOLTAGE
3000	6.113
3500	6.920
3000	6.393
2500	5.729
2000	4.965
1500	4.160
1000	3.101
1500	3.840
2000	4.613
2500	5.349
3000	6.101
3500	6.929
3000	6.380
2500	5.720
2000	5.043
1500	4.093
1000	3.199
500	1.091
250	1.071
0	0.022

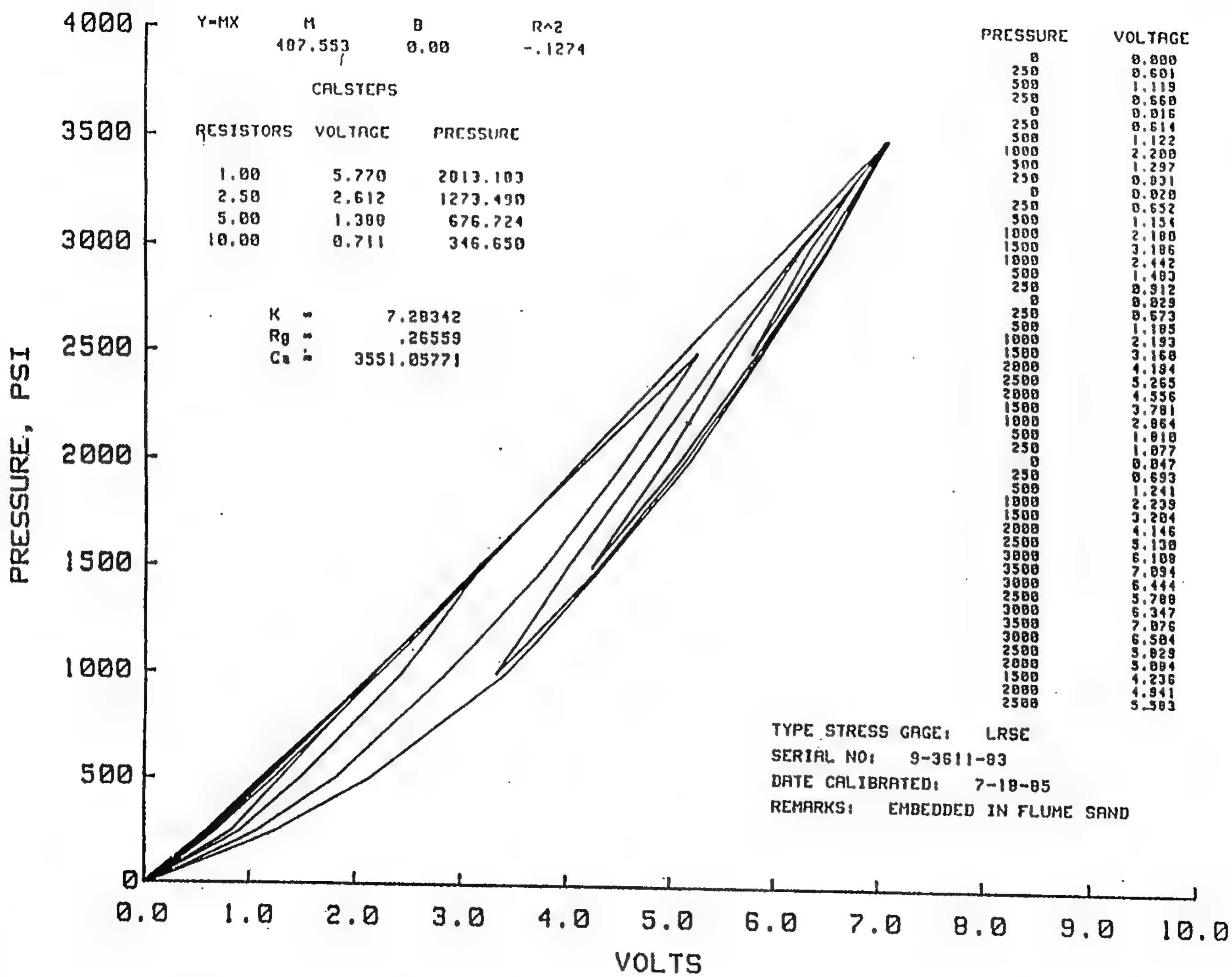
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3703-84
DATE CALIBRATED: 7-10-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 71



PRESSURE, PSI
VOLTS
4000
3500
3000
2500
2000
1500
1000
500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Y=MX M B R^2
451.930 0.00 -.1146
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.116 2312.122
2.50 2.290 1030.557
5.00 1.219 551.005
10.00 0.623 281.513
K = 6.37263
Rg = .24897
Ca =. 2000.04251
PRESSURE VOLTAGE
0 0.000
250 0.707
500 1.853
250 0.803
0 0.005
250 0.697
500 1.278
1000 2.449
500 1.518
250 0.803
0 0.001
250 0.683
500 1.268
1000 2.399
1500 3.500
1000 2.827
500 1.697
250 0.982
0 0.010
250 0.697
500 1.200
1000 2.373
1500 3.416
2000 4.501
2500 5.602
2000 4.834
1500 4.050
1000 3.107
500 1.880
250 1.067
0 0.008
250 0.710
500 1.291
1000 2.390
1500 3.515
2000 4.431
2500 5.486
3000 6.563
3500 7.645
3000 6.966
2500 6.210
3000 6.862
3500 7.602
3000 6.950
2500 6.316
2000 5.526
1500 4.543
2000 5.262
2500 5.976
PRESSURE VOLTAGE
3000 6.730
3500 7.633
3000 6.980
2500 6.229
2000 5.335
1500 4.601
1000 3.491
1500 4.272
2000 5.070
2500 5.870
3000 6.721
3500 7.609
3000 7.040
2500 6.306
2000 5.630
1500 4.674
1000 3.619
500 2.192
250 1.263
0 0.003
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3694-84
DATE CALIBRATED: 7-10-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 72



Y=MX	M	B	R^2
	407.553	0.00	-.1274

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.770	2013.103
2.50	2.612	1273.490
5.00	1.300	676.724
10.00	0.711	346.650

K = 7.28342
Rg = .26559
Cs = 3551.05771

PRESSURE	VOLTAGE
0	0.000
250	0.601
500	1.119
250	0.560
0	0.016
250	0.614
500	1.122
1000	2.200
500	1.297
250	0.031
0	0.020
250	0.652
500	1.154
1000	2.100
1500	3.186
1000	2.442
500	1.403
250	0.912
0	0.029
250	0.573
500	1.105
1000	2.193
1500	3.168
2000	4.194
2500	5.265
2000	4.556
1500	3.781
1000	2.864
500	1.810
250	1.077
0	0.047
250	0.693
500	1.241
1000	2.239
1500	3.204
2000	4.146
2500	5.130
3000	6.108
3500	7.094
3000	6.444
2500	5.700
3000	6.347
3500	7.076
3000	6.504
2500	5.829
2000	5.004
1500	4.236
2000	4.941
2500	5.303

PRESSURE	VOLTAGE
3000	6.260
3500	7.100
3000	6.512
2500	5.864
2000	5.133
1500	4.301
1000	3.333
1500	4.005
2000	4.750
2500	5.409
3000	6.243
3500	7.116
3000	6.520
2500	5.804
2000	5.102
1500	4.327
1000	3.423
500	2.130
250	1.250
0	0.044

TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3611-83
DATE CALIBRATED: 7-18-85
REMARKS: EMBEDDED IN FLUME SAND

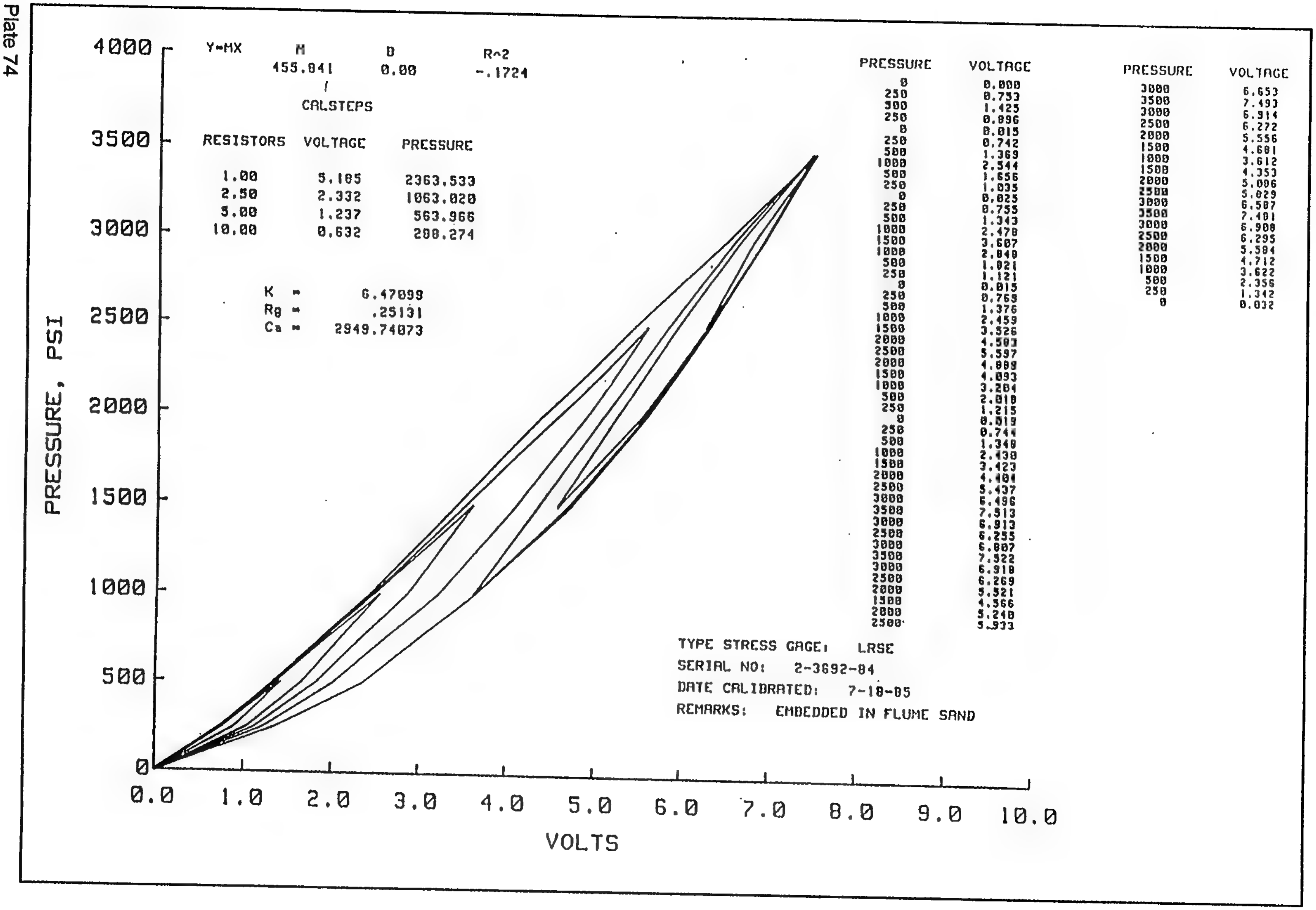
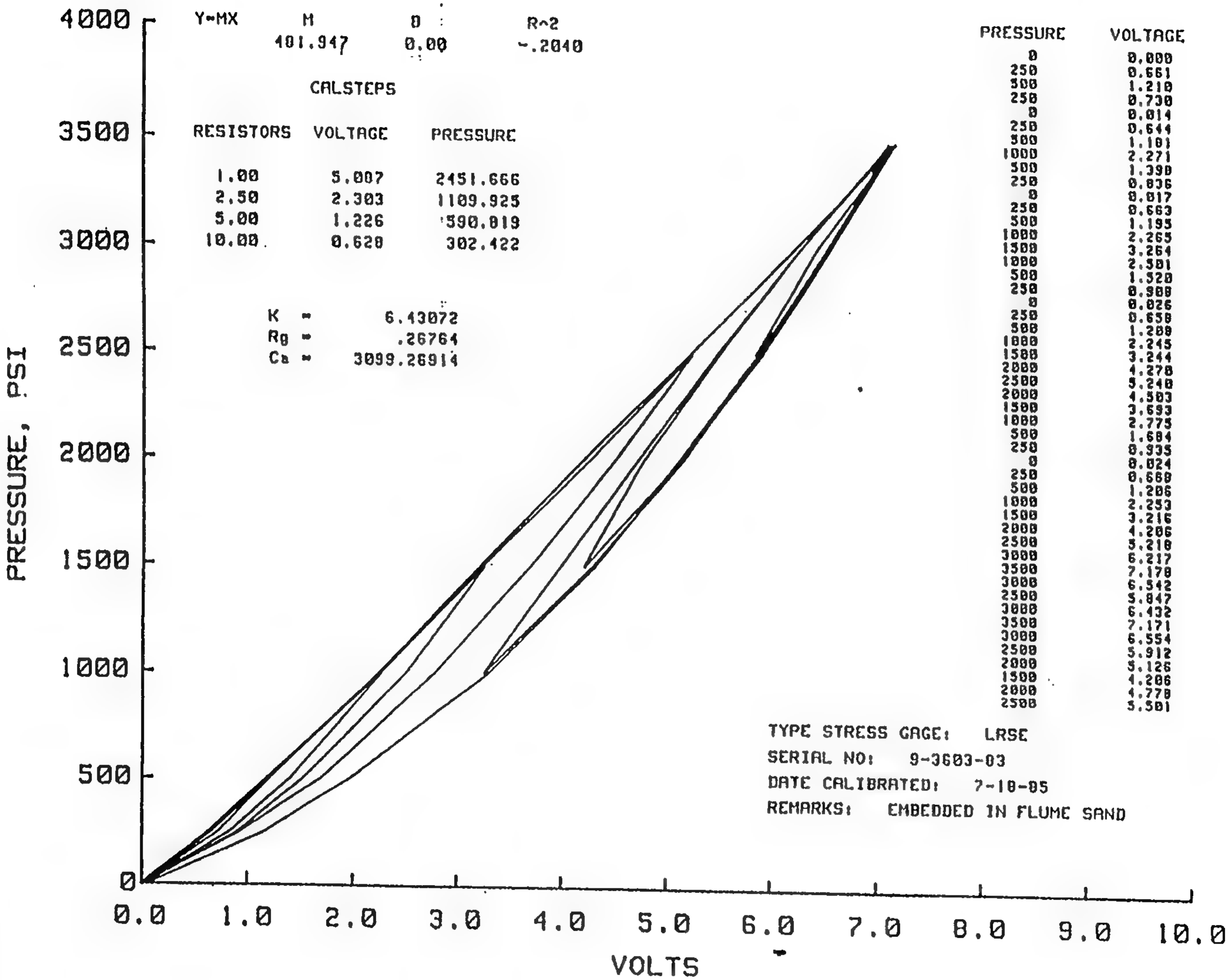

Y=MX
M
455.841
B
0.00
R^2
-.1724
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.105 2363.533
2.50 2.332 1063.020
5.00 1.237 563.966
10.00 0.632 280.274
K = 6.47099
Rg = .25131
Ca = 2949.74073
PRESSURE VOLTAGE
0 0.000
250 0.753
300 1.425
250 0.896
0 0.015
250 0.742
500 1.369
1000 2.544
500 1.656
250 1.035
0 0.025
250 0.755
500 1.343
1000 2.470
1500 3.607
1000 2.840
500 1.021
250 1.121
0 0.015
250 0.765
500 1.376
1000 2.459
1500 3.526
2000 4.503
2500 5.597
2000 4.809
1500 4.093
1000 3.204
500 2.010
250 1.215
0 0.019
250 0.744
500 1.340
1000 2.430
1500 3.423
2000 4.404
2500 5.437
3000 6.496
3500 7.513
3000 6.913
2500 6.255
3000 6.807
3500 7.522
3000 6.918
2500 6.269
2000 5.521
1500 4.566
2000 5.240
2500 5.933
PRESSURE VOLTAGE
3000 6.653
3500 7.493
3000 6.914
2500 6.272
2000 5.556
1500 4.681
1000 3.612
1500 4.353
2000 5.006
2500 5.029
3000 6.507
3500 7.401
3000 6.900
2500 6.295
2000 5.584
1500 4.712
1000 3.622
500 2.356
250 1.342
0 0.032
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3692-84
DATE CALIBRATED: 7-18-85
REMARKS: EMBEDDED IN FLUME SAND
4000
3500
3000
2500
2000
1500
1000
500
0
PRESSURE, PSI
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 74



Y=MX	M	B	R^2
	401.947	0.00	-.2040

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.007	2451.666
2.50	2.303	1109.925
5.00	1.226	590.819
10.00	0.628	302.422

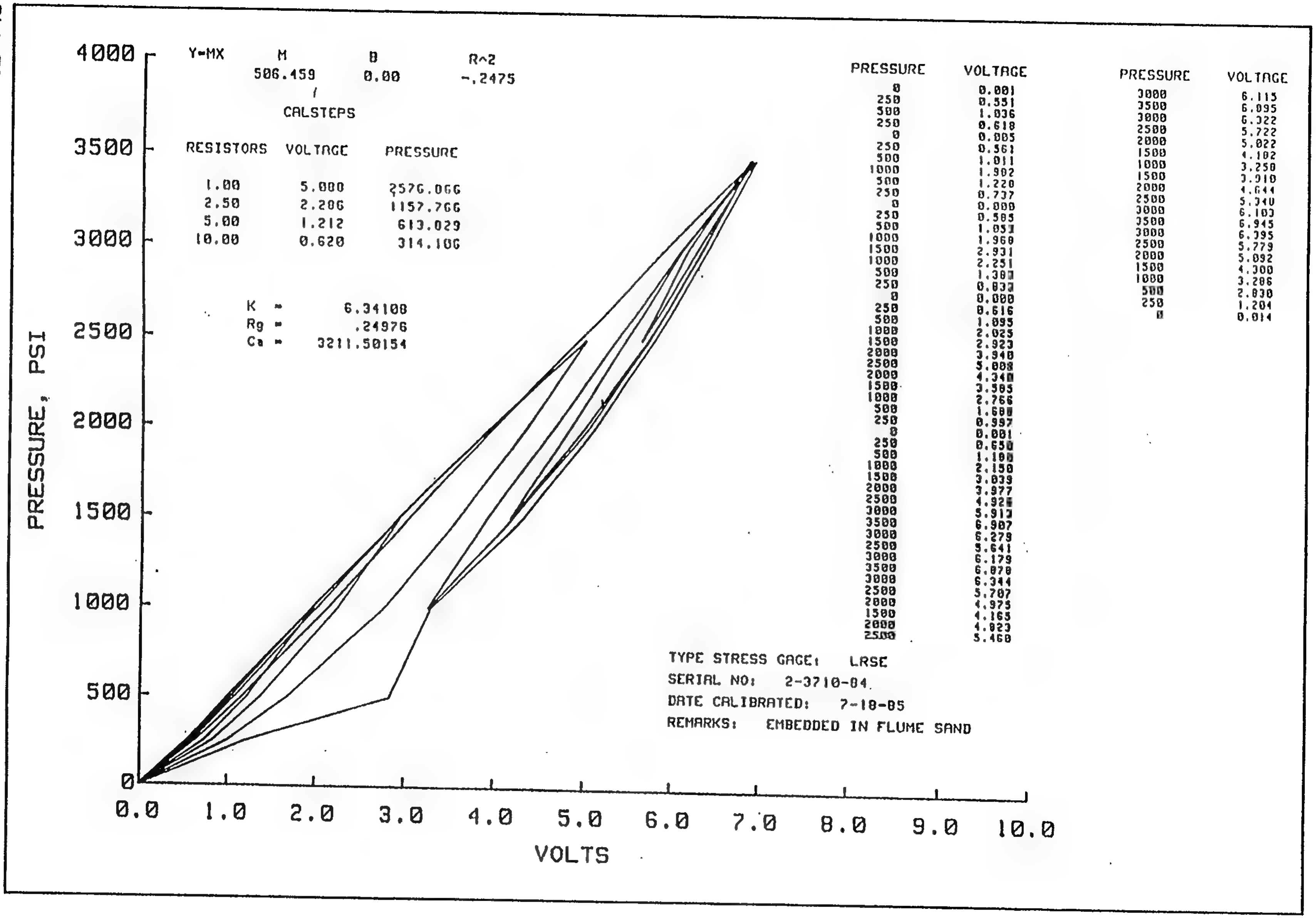
K = 6.43072
Rg = .26764
Cs = 3099.26914

PRESSURE	VOLTAGE
0	0.000
250	0.661
500	1.210
250	0.730
0	0.014
250	0.644
500	1.101
1000	2.271
500	1.390
250	0.836
0	0.017
250	0.663
500	1.195
1000	2.265
1500	3.264
1000	2.501
500	1.520
250	0.900
0	0.026
250	0.650
500	1.208
1000	2.245
1500	3.244
2000	4.278
2500	5.240
2000	4.503
1500	3.693
1000	2.775
500	1.684
250	0.935
0	0.024
250	0.660
500	1.206
1000	2.253
1500	3.216
2000	4.206
2500	5.218
3000	6.217
3500	7.178
3000	6.542
2500	5.847
3000	6.432
3500	7.171
3000	6.554
2500	5.912
2000	5.126
1500	4.206
2000	4.778
2500	5.501

PRESSURE	VOLTAGE
3000	6.272
3500	7.143
3000	6.522
2500	5.081
2000	5.151
1500	4.275
1000	3.247
1500	3.906
2000	4.726
2500	5.476
3000	6.274
3500	7.113
3000	6.519
2500	5.864
2000	5.100
1500	4.309
1000	3.290
500	1.956
250	1.161
0	0.059

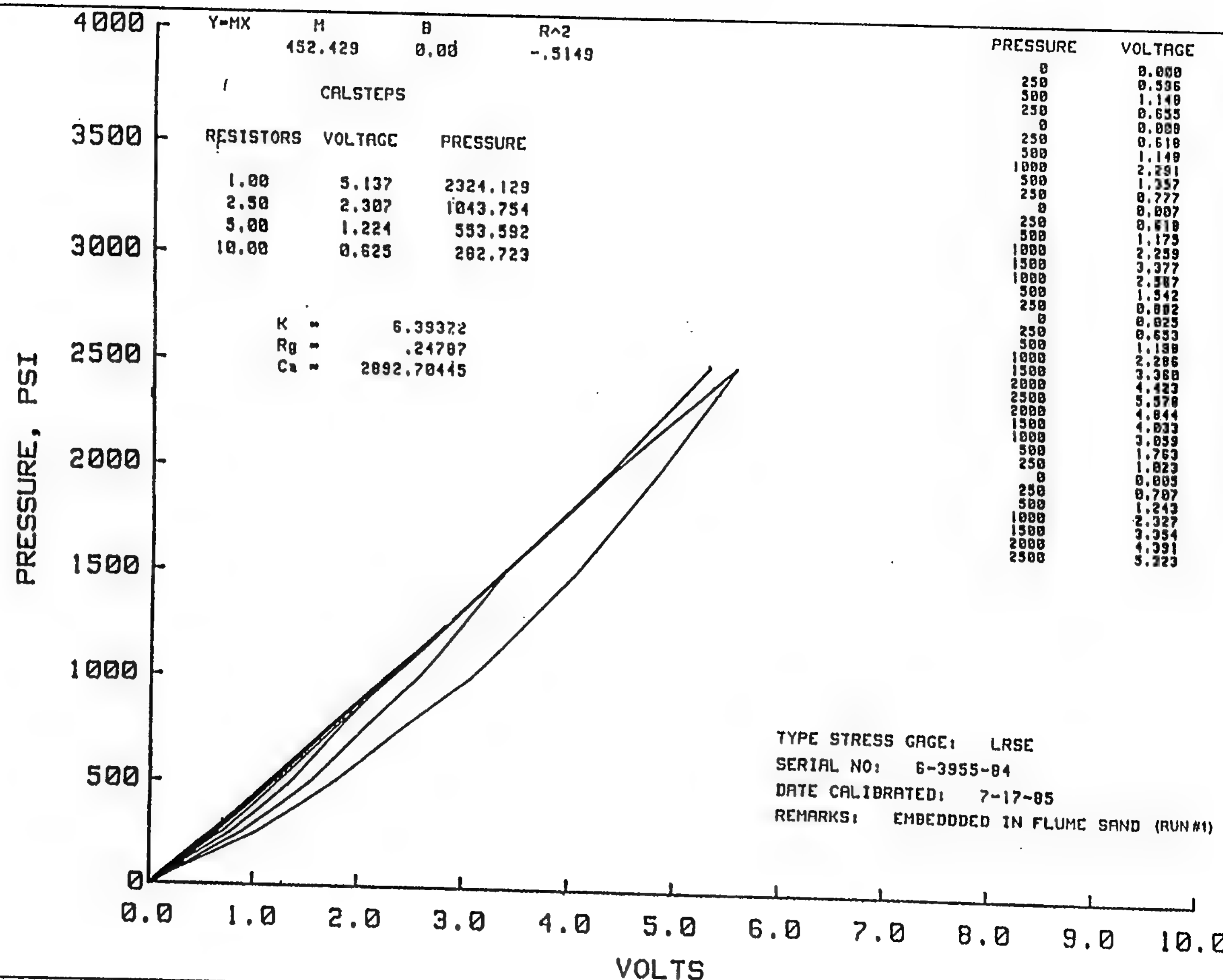
TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3603-03
DATE CALIBRATED: 7-10-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 75



PRESSURE, PSI
VOLTS
0
500
1000
1500
2000
2500
3000
3500
4000
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Y=MX M B R^2
506.459 0.00 -.2475
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.000 2576.066
2.50 2.206 1157.766
5.00 1.212 613.029
10.00 0.620 314.106
K = 6.34108
Rg = .24976
Ca = 3211.50154
PRESSURE VOLTAGE
0 0.001
250 0.551
500 1.036
250 0.618
0 0.005
250 0.561
500 1.011
1000 1.902
500 1.220
250 0.737
0 0.000
250 0.585
500 1.053
1000 1.960
1500 2.931
1000 2.251
500 1.380
250 0.833
0 0.000
250 0.616
500 1.095
1000 2.025
1500 2.923
2000 3.940
2500 5.008
2000 4.340
1500 3.585
1000 2.766
500 1.680
250 0.997
0 0.001
250 0.650
500 1.180
1000 2.150
1500 3.039
2000 3.977
2500 4.928
3000 5.913
3500 6.907
3000 6.279
2500 5.641
3000 6.179
3500 6.870
3000 6.344
2500 5.707
2000 4.975
1500 4.165
2000 4.823
2500 5.460
PRESSURE VOLTAGE
3000 6.115
3500 6.095
3000 6.322
2500 5.722
2000 5.022
1500 4.102
1000 3.250
1500 3.910
2000 4.644
2500 5.340
3000 6.103
3500 6.945
3000 6.395
2500 5.779
2000 5.092
1500 4.300
1000 3.286
500 2.830
250 1.204
0 0.014
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-04
DATE CALIBRATED: 7-18-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 76



Y=MX	M	B	R^2
	452.429	0.00	-.5149

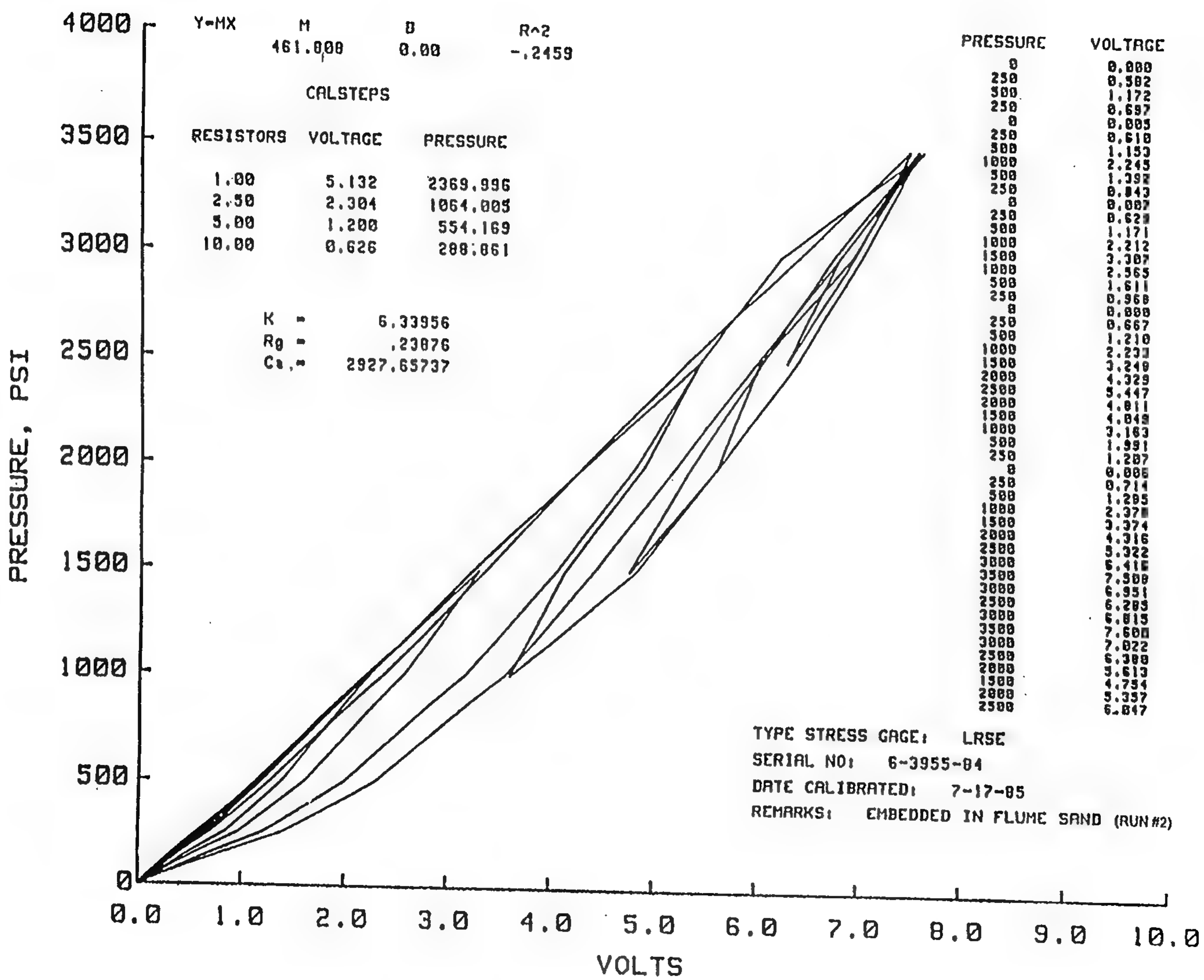
CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.137	2324.129
2.50	2.307	1043.754
5.00	1.224	553.592
10.00	0.625	282.723

K = 6.39372
Rg = .24707
Ca = 2892.70445

PRESSURE	VOLTAGE
0	0.000
250	0.536
500	1.140
250	0.655
0	0.000
250	0.610
500	1.140
1000	2.291
500	1.357
250	0.777
0	0.007
250	0.610
500	1.173
1000	2.259
1500	3.377
1000	2.307
500	1.542
250	0.802
0	0.025
250	0.653
500	1.138
1000	2.286
1500	3.360
2000	4.423
2500	5.570
2000	4.844
1500	4.033
1000	3.059
500	1.763
250	1.023
0	0.005
250	0.707
500	1.243
1000	2.327
1500	3.354
2000	4.391
2500	5.223

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 7-17-85
REMARKS: EMBEDDDED IN FLUME SAND (RUN #1)



Y=MX	M	B	R^2
	461.000	0.00	-.2459

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.132	2369.996
2.50	2.304	1064.005
5.00	1.200	554.169
10.00	0.626	288.861

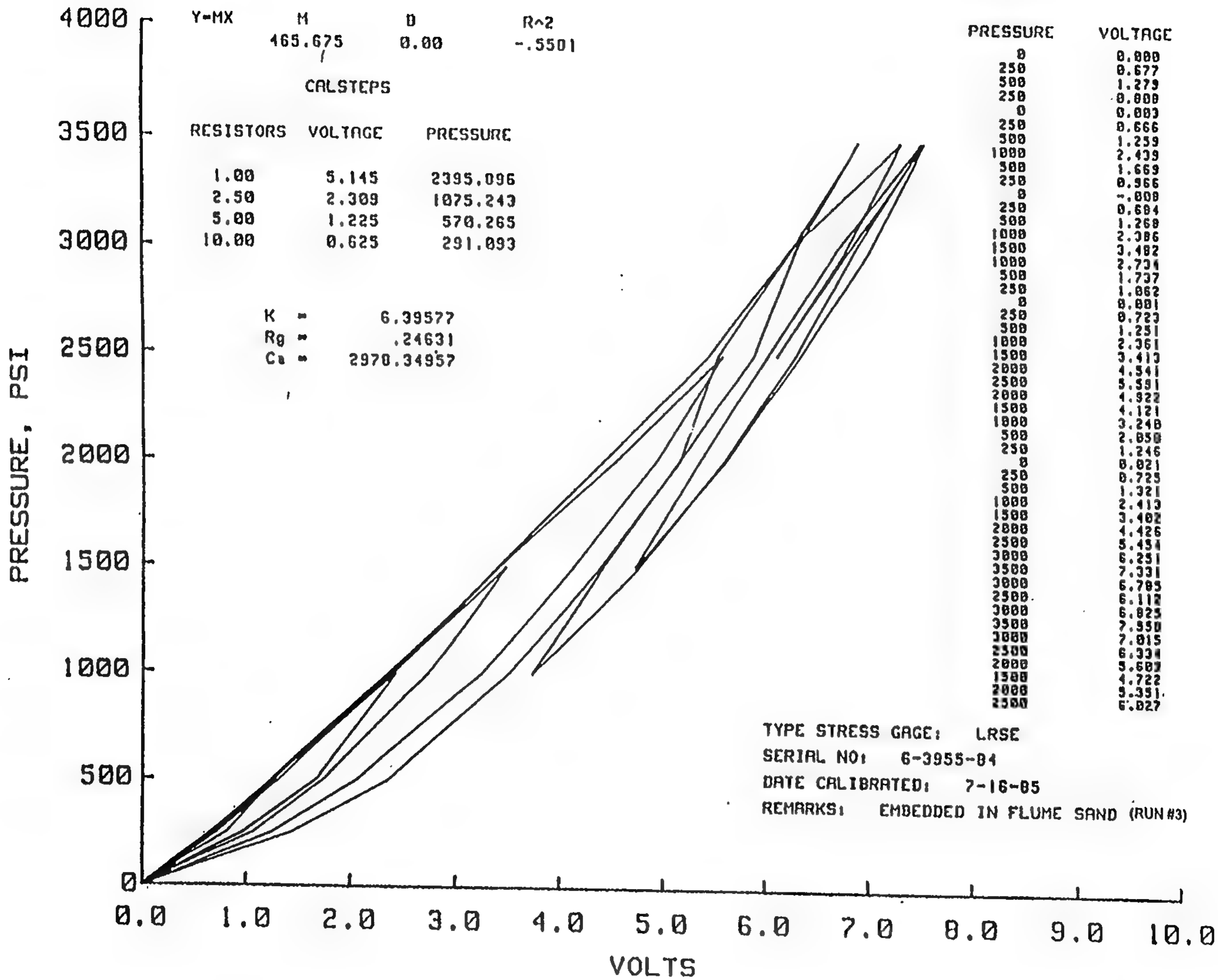
K = 6.33956
Rg = .23876
Cs.= 2927.65737

PRESSURE	VOLTAGE
0	0.000
250	0.502
500	1.172
250	0.697
0	0.005
250	0.610
500	1.153
1000	2.245
500	1.392
250	0.843
0	0.007
250	0.62[illegible]
500	1.171
1000	2.212
1500	3.307
1000	2.565
500	1.611
250	0.968
0	0.000
250	0.667
500	1.210
1000	2.23[illegible]
1500	3.240
2000	4.329
2500	5.447
2000	4.811
1500	4.049
1000	3.163
500	1.991
250	1.207
0	0.006
250	0.714
500	1.205
1000	2.378
1500	3.374
2000	4.316
2500	5.322
3000	6.416
3500	7.500
3000	6.951
2500	6.203
3000	6.815
3500	7.600
3000	7.022
2500	6.380
2000	5.613
1500	4.754
2000	5.357
2500	6.047

PRESSURE	VOLTAGE
3000	6.732
3500	7.504
3000	6.930
2500	6.019
2000	5.609
1500	4.810
1000	3.603
1500	4.138
2000	4.899
2500	5.446
3000	6.240
3500	7.641
3000	6.808
2500	5.980
2000	5.199
1500	4.410
1000	3.551
500	2.280
250	1.395
0	0.005

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 7-17-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #2)

Plate 78



Y=MX	M	B	R^2
	465.675	0.00	-.5501

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.145	2395.096
2.50	2.309	1075.243
5.00	1.225	570.265
10.00	0.625	291.093

K = 6.39577
Rg = .24631
Ca = 2970.34957

PRESSURE	VOLTAGE
0	0.000
250	0.677
500	1.279
250	0.000
0	0.003
250	0.666
500	1.259
1000	2.439
500	1.669
250	0.966
0	-.000
250	0.684
500	1.268
1000	2.386
1500	3.482
1000	2.734
500	1.737
250	1.062
0	0.001
250	0.723
500	1.251
1000	2.361
1500	3.413
2000	4.541
2500	5.591
2000	4.922
1500	4.121
1000	3.248
500	2.058
250	1.246
0	0.021
250	0.725
500	1.321
1000	2.413
1500	3.402
2000	4.426
2500	5.454
3000	6.251
3500	7.331
3000	6.785
2500	6.112
3000	6.825
3500	7.550
3000	7.015
2500	6.334
2000	5.603
1500	4.722
2000	5.351
2500	6.027

PRESSURE	VOLTAGE
3000	6.705
3500	7.527
3000	6.872
2500	6.289
2000	5.579
1500	4.756
1000	3.730
1500	4.415
2000	5.151
2500	5.895
3000	6.309
3500	6.922
3000	6.256
2500	5.539
2000	5.151
1500	4.381
1000	3.501
500	2.350
250	1.430
0	0.019

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 7-16-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #3)

Plate 79

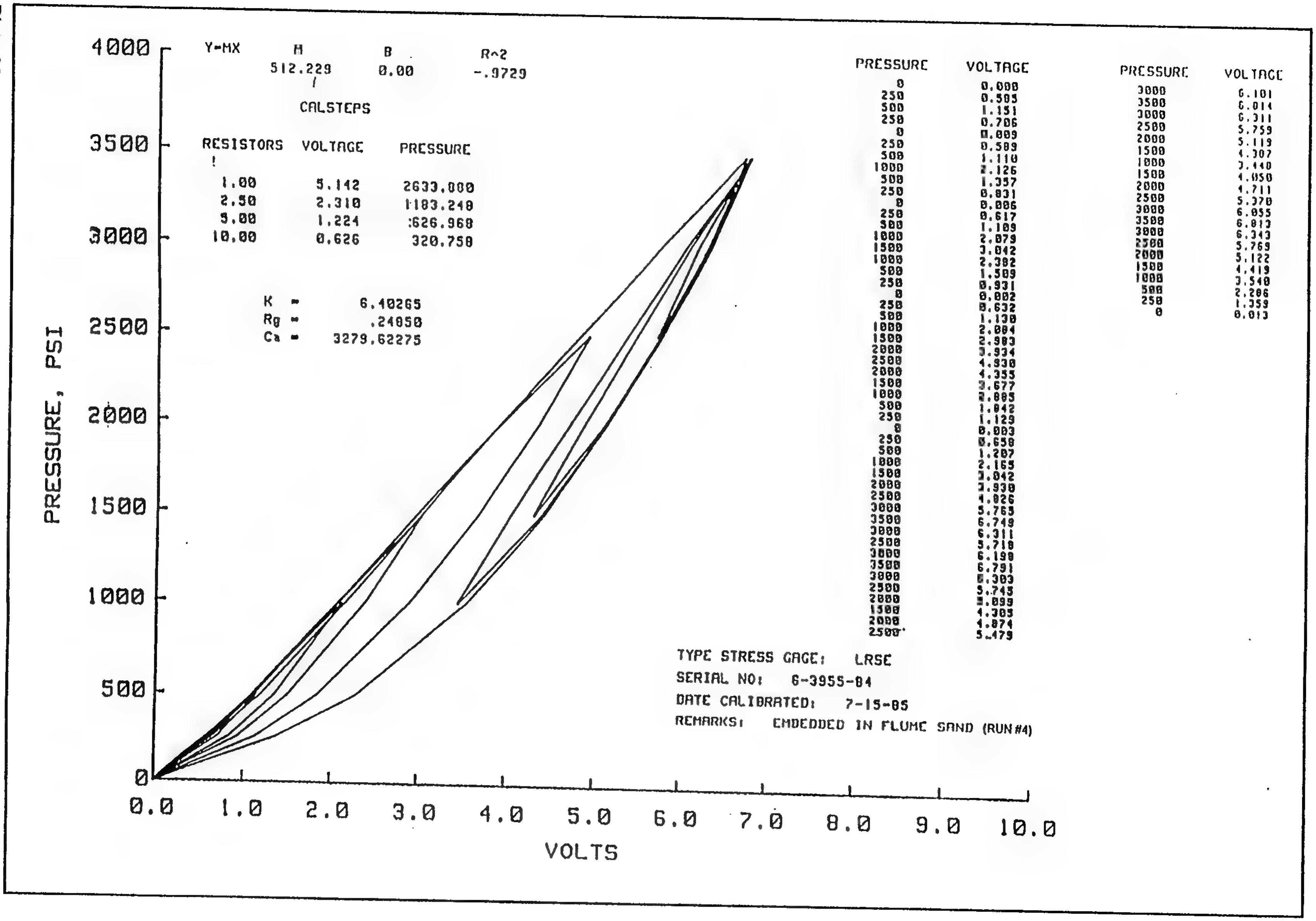
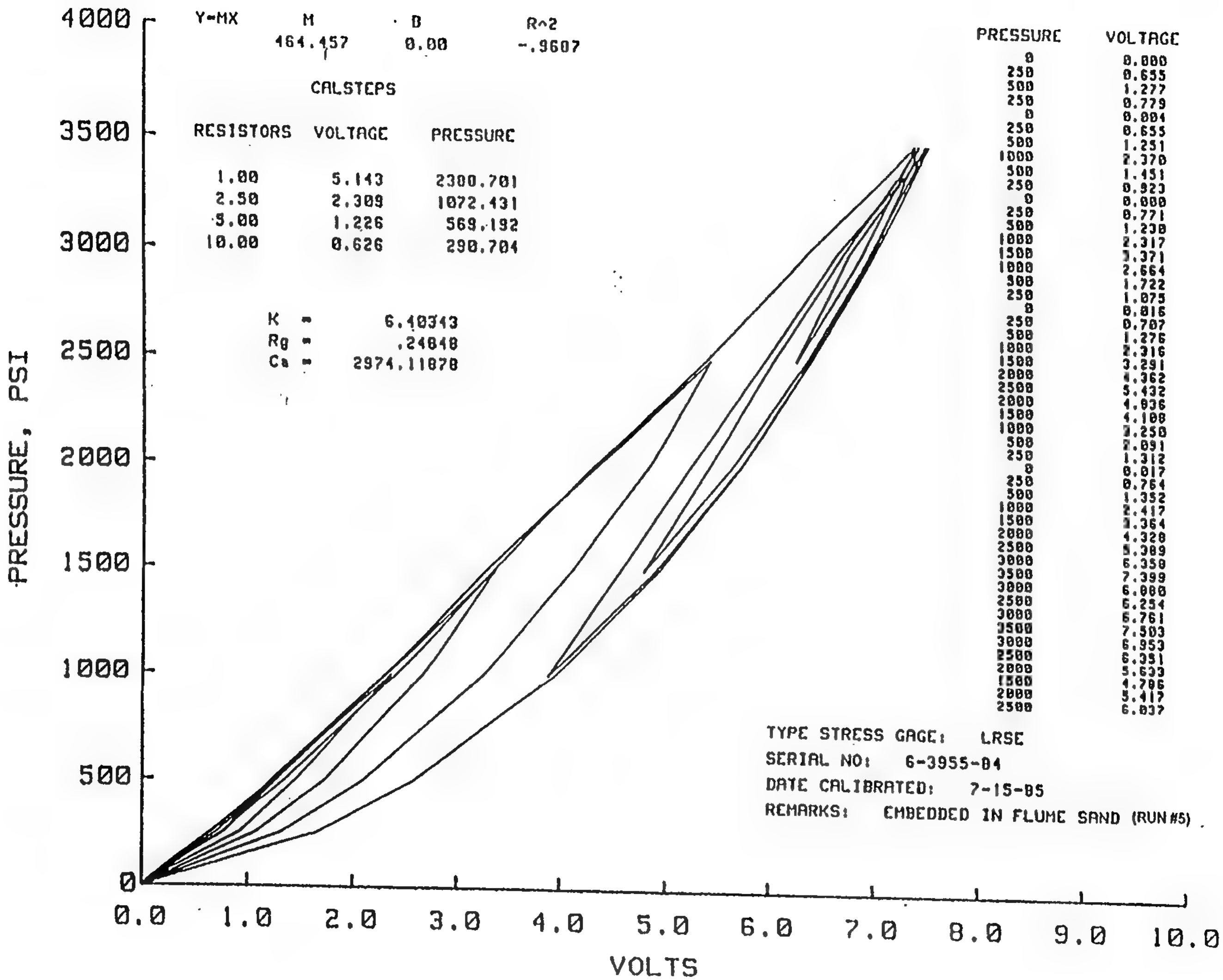

Y=MX
M 512.229
B 0.00
R^2 -.9729
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.142 2633.000
2.50 2.310 1183.240
5.00 1.224 626.960
10.00 0.626 320.750
K = 6.40265
Rg = .24050
Ca = 3279.62275
PRESSURE VOLTAGE
0 0.000
250 0.505
500 1.151
250 0.706
0 0.009
250 0.509
500 1.110
1000 2.126
500 1.357
250 0.831
0 0.006
250 0.617
500 1.109
1000 2.079
1500 3.042
1000 2.382
500 1.509
250 0.931
0 0.002
250 0.632
500 1.130
1000 2.004
1500 2.983
2000 3.934
2500 4.830
2000 4.355
1500 3.677
1000 2.885
500 1.842
250 1.129
0 0.003
250 0.658
500 1.207
1000 2.165
1500 3.042
2000 3.930
2500 4.826
3000 5.765
3500 6.749
3000 6.311
2500 5.718
3000 6.190
3500 6.791
3000 6.303
2500 5.745
2000 5.099
1500 4.305
2000 4.874
2500 5.479
PRESSURE VOLTAGE
3000 6.101
3500 6.014
3000 6.311
2500 5.759
2000 5.119
1500 4.307
1000 3.440
1500 4.050
2000 4.711
2500 5.370
3000 6.055
3500 6.813
3000 6.343
2500 5.769
2000 5.122
1500 4.419
1000 3.540
500 2.206
250 1.359
0 0.013
TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 7-15-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #4)
PRESSURE, PSI
4000
3500
3000
2500
2000
1500
1000
500
0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
VOLTS

Plate 80



Y=MX	M	B	R^2
	464.457	0.00	-.9607

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.143	2300.701
2.50	2.309	1072.431
5.00	1.226	569.192
10.00	0.626	290.704

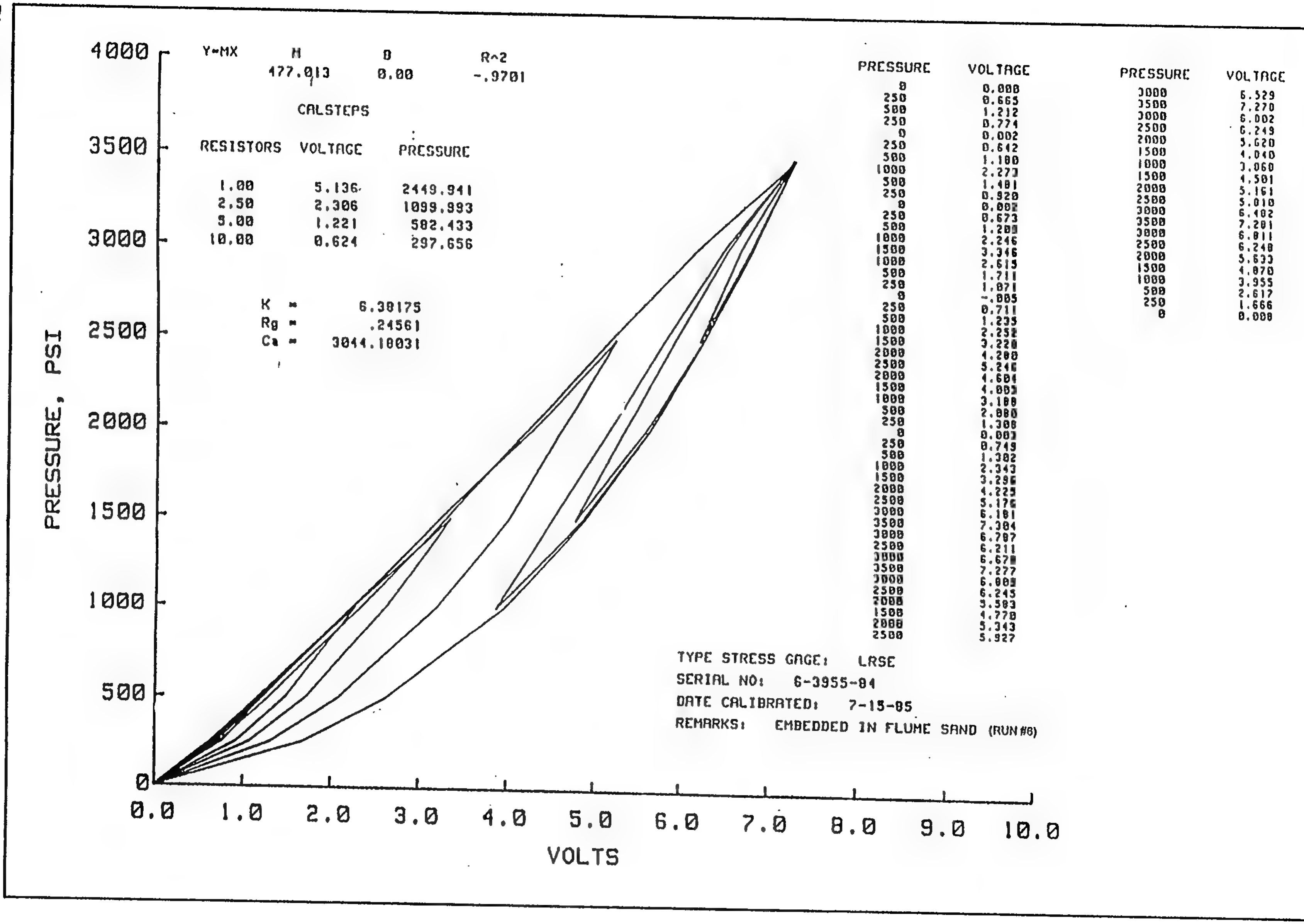
K = 6.40343
Rg = .24848
Ca = 2974.11878

PRESSURE	VOLTAGE
0	0.000
250	0.655
500	1.277
250	0.779
0	0.004
250	0.655
500	1.251
1000	2.370
500	1.451
250	0.923
0	0.000
250	0.771
500	1.230
1000	2.317
1500	3.371
1000	2.664
500	1.722
250	1.075
0	0.816
250	0.707
500	1.276
1000	2.316
1500	3.291
2000	4.362
2500	5.432
2000	4.836
1500	4.108
1000	3.250
500	2.091
250	1.312
0	0.017
250	0.764
500	1.352
1000	2.417
1500	3.364
2000	4.328
2500	5.389
3000	6.358
3500	7.399
3000	6.000
2500	6.254
3000	6.761
3500	7.503
3000	6.953
2500	6.351
2000	5.633
1500	4.706
2000	5.417
2500	6.037

PRESSURE	VOLTAGE
3000	6.703
3500	7.430
3000	6.979
2500	6.380
2000	5.713
1500	4.890
1000	3.870
1500	4.570
2000	5.236
2500	5.055
3000	6.642
3500	7.530
3000	6.997
2500	6.394
2000	5.721
1500	4.924
1000	3.938
500	2.571
250	1.644
0	0.023

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 7-15-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #5)

Plate 81

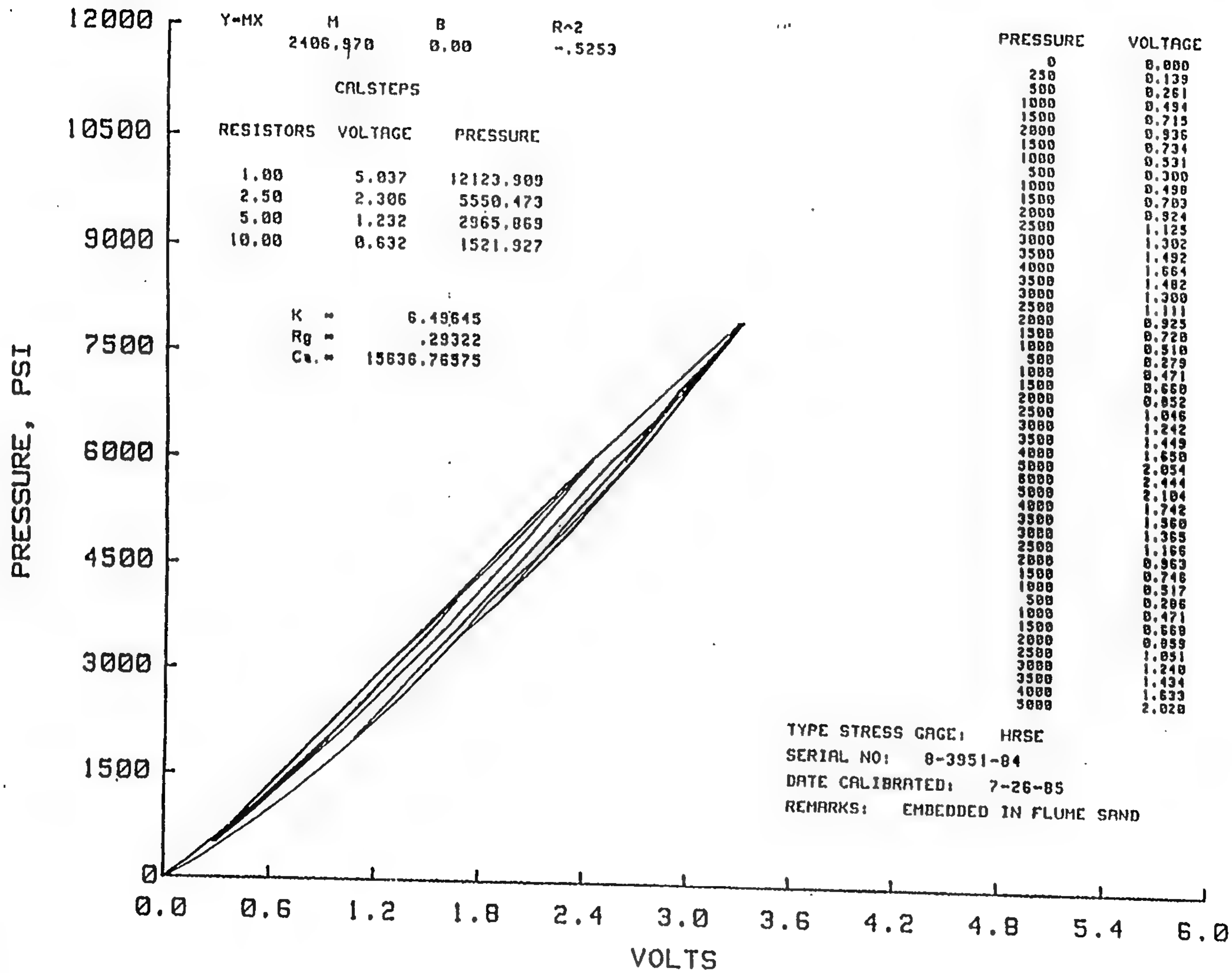


RESISTORS	VOLTAGE	PRESSURE
1.00	5.136	2449.941
2.50	2.306	1099.993
5.00	1.221	582.433
10.00	0.624	297.656

PRESSURE	VOLTAGE
0	0.000
250	0.665
500	1.212
250	0.774
0	0.002
250	0.642
500	1.100
1000	2.273
500	1.481
250	0.920
0	0.002
250	0.673
500	1.208
1000	2.246
1500	3.346
1000	2.615
500	1.711
250	1.071
0	-.005
250	0.711
500	1.235
1000	2.252
1500	3.220
2000	4.200
2500	5.246
2000	4.604
1500	4.003
1000	3.100
500	2.080
250	1.300
0	0.003
250	0.749
500	1.302
1000	2.343
1500	3.296
2000	4.225
2500	5.176
3000	6.181
3500	7.304
3000	6.787
2500	6.211
3000	6.678
3500	7.277
3000	6.003
2500	6.245
2000	5.503
1500	4.770
2000	5.343
2500	5.927

PRESSURE	VOLTAGE
3000	6.529
3500	7.270
3000	6.002
2500	6.249
2000	5.620
1500	4.040
1000	3.060
1500	4.501
2000	5.161
2500	5.010
3000	6.402
3500	7.201
3000	6.811
2500	6.240
2000	5.633
1500	4.070
1000	3.955
500	2.617
250	1.666
0	0.000

Plate 82



Y=MX	M	B	R^2
	2406.970	0.00	-.5253

CALSTEPS

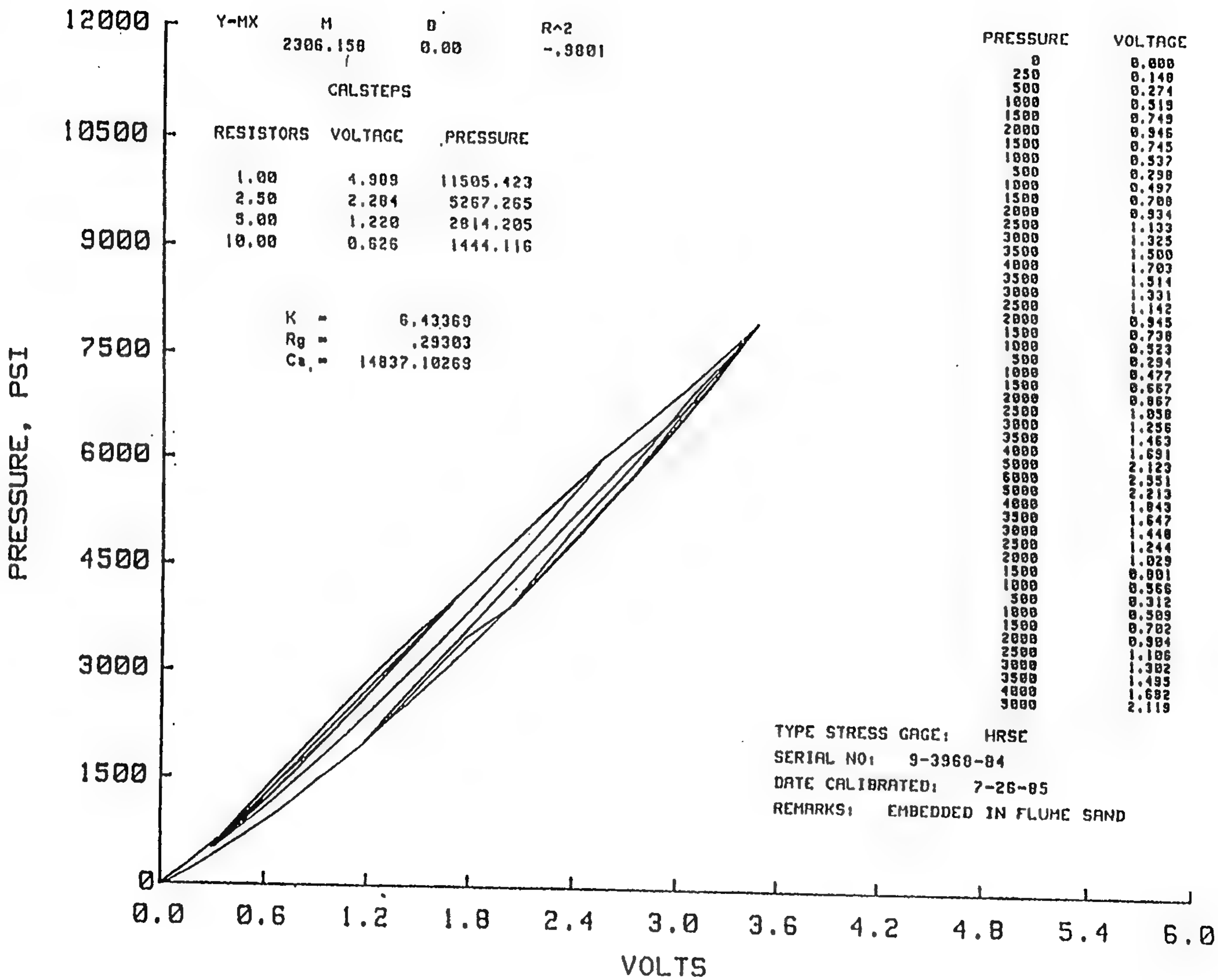
RESISTORS	VOLTAGE	PRESSURE
1.00	5.037	12123.909
2.50	2.306	5550.473
5.00	1.232	2965.869
10.00	0.632	1521.927

K = 6.49645
Rg = .29322
Ca. = 15636.76575

PRESSURE	VOLTAGE
0	0.000
250	0.139
500	0.261
1000	0.494
1500	0.715
2000	0.936
1500	0.734
1000	0.531
500	0.300
1000	0.498
1500	0.703
2000	0.924
2500	1.125
3000	1.302
3500	1.492
4000	1.664
3500	1.482
3000	1.300
2500	1.111
2000	0.925
1500	0.728
1000	0.510
500	0.279
1000	0.471
1500	0.660
2000	0.852
2500	1.046
3000	1.242
3500	1.449
4000	1.650
5000	2.054
6000	2.444
5000	2.104
4000	1.742
3500	1.560
3000	1.365
2500	1.166
2000	0.963
1500	0.748
1000	0.517
500	0.286
1000	0.471
1500	0.660
2000	0.859
2500	1.051
3000	1.240
3500	1.434
4000	1.633
5000	2.020

PRESSURE	VOLTAGE
6000	2.433
7000	2.875
8000	3.302
7000	2.973
6000	2.633
7000	2.955
8000	3.317
7000	2.995
6000	2.662
5000	2.309
4000	1.911
5000	2.256
6000	2.614
7000	2.945
8000	3.331
7000	3.008
6000	2.673
5000	2.320
4000	1.915
3500	1.680
3000	1.490
2500	1.305
2000	1.075
2500	1.266
3000	1.446
3500	1.631
4000	1.819
5000	2.187
6000	2.553
7000	2.902
8000	3.311
7000	2.996
6000	2.672
5000	2.281
4000	1.850
3500	1.682
3000	1.502
2500	1.306
2000	1.090
1500	0.857
1000	0.610
500	0.333
250	0.108
0	0.010

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3951-84
DATE CALIBRATED: 7-26-85
REMARKS: EMBEDDED IN FLUME SAND



Y-MX	M	B	R^2
	2306.158	0.00	-.9801

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.909	11505.423
2.50	2.284	5267.265
5.00	1.220	2814.205
10.00	0.626	1444.116

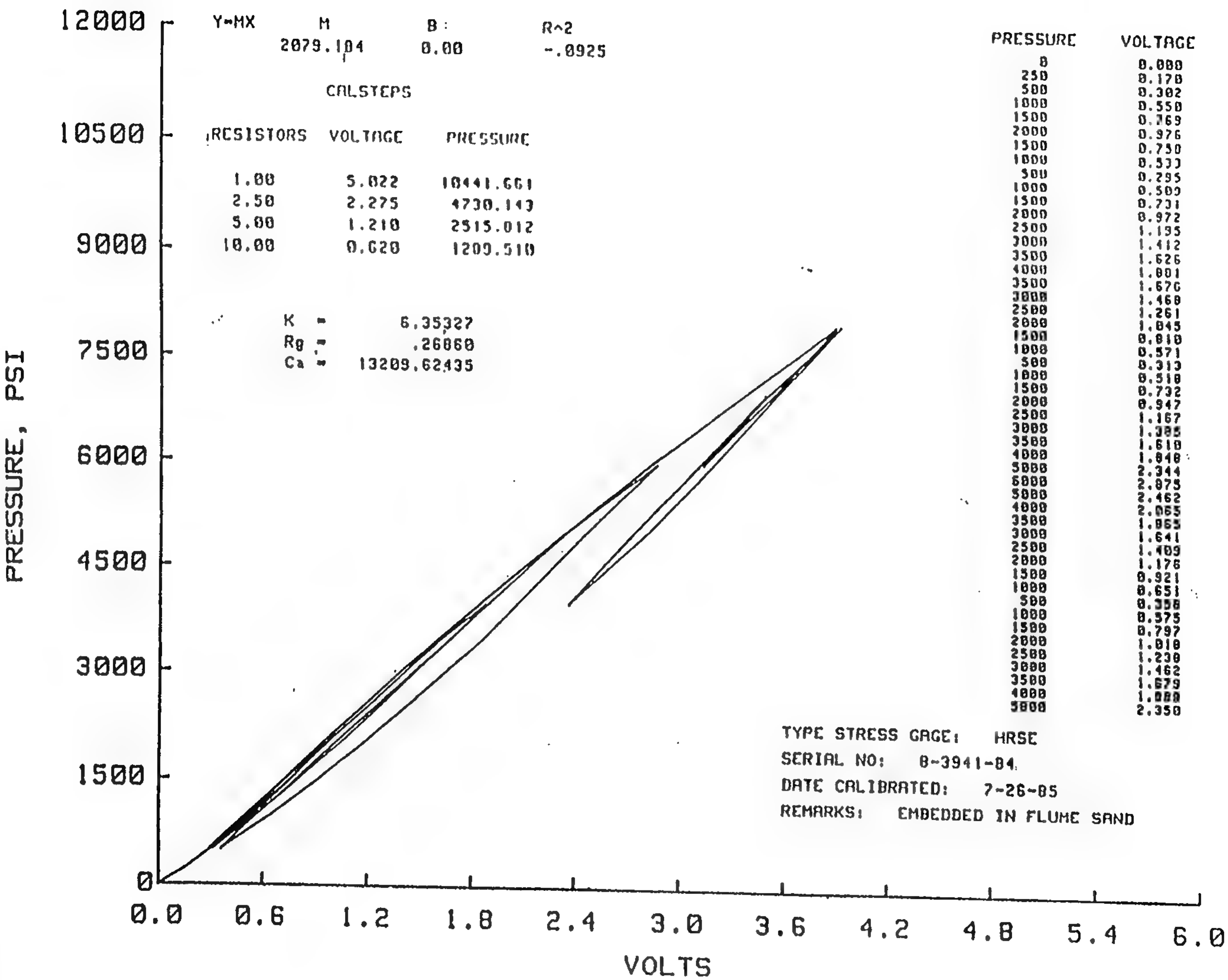
K = 6.43369
Rg = .29303
Ca = 14837.10269

PRESSURE	VOLTAGE
0	0.000
250	0.140
500	0.274
1000	0.519
1500	0.749
2000	0.946
1500	0.745
1000	0.537
500	0.298
1000	0.497
1500	0.708
2000	0.934
2500	1.133
3000	1.325
3500	1.500
4000	1.703
3500	1.514
3000	1.331
2500	1.142
2000	0.945
1500	0.738
1000	0.523
500	0.294
1000	0.477
1500	0.667
2000	0.867
2500	1.058
3000	1.256
3500	1.463
4000	1.691
5000	2.123
6000	2.351
5000	2.213
4000	1.843
3500	1.647
3000	1.448
2500	1.244
2000	1.029
1500	0.801
1000	0.566
500	0.312
1000	0.509
1500	0.702
2000	0.904
2500	1.106
3000	1.302
3500	1.495
4000	1.682
5000	2.119

PRESSURE	VOLTAGE
6000	2.541
7000	3.029
8000	3.479
7000	3.163
6000	2.797
7000	3.126
8000	3.485
7000	3.161
6000	2.806
5000	2.439
4000	2.053
5000	2.305
6000	2.755
7000	3.098
8000	3.482
7000	3.169
6000	2.822
5000	2.442
4000	2.055
3500	1.848
3000	1.638
2500	1.415
2000	1.181
2500	1.366
3000	1.555
3500	1.744
4000	1.932
5000	2.316
6000	2.696
7000	3.153
8000	3.484
7000	3.153
6000	2.812
5000	2.452
4000	2.068
3500	1.774
3000	1.581
2500	1.391
2000	1.189
1500	0.926
1000	0.673
500	0.372
250	0.212
0	0.023

TYPE STRESS GAGE: HRSE
SERIAL NO: 9-3960-84
DATE CALIBRATED: 7-26-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 84



Y=MX	M	B :	R^2
	2079.104	0.00	-.0925

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.022	10441.661
2.50	2.275	4730.143
5.00	1.210	2515.012
10.00	0.620	1209.510

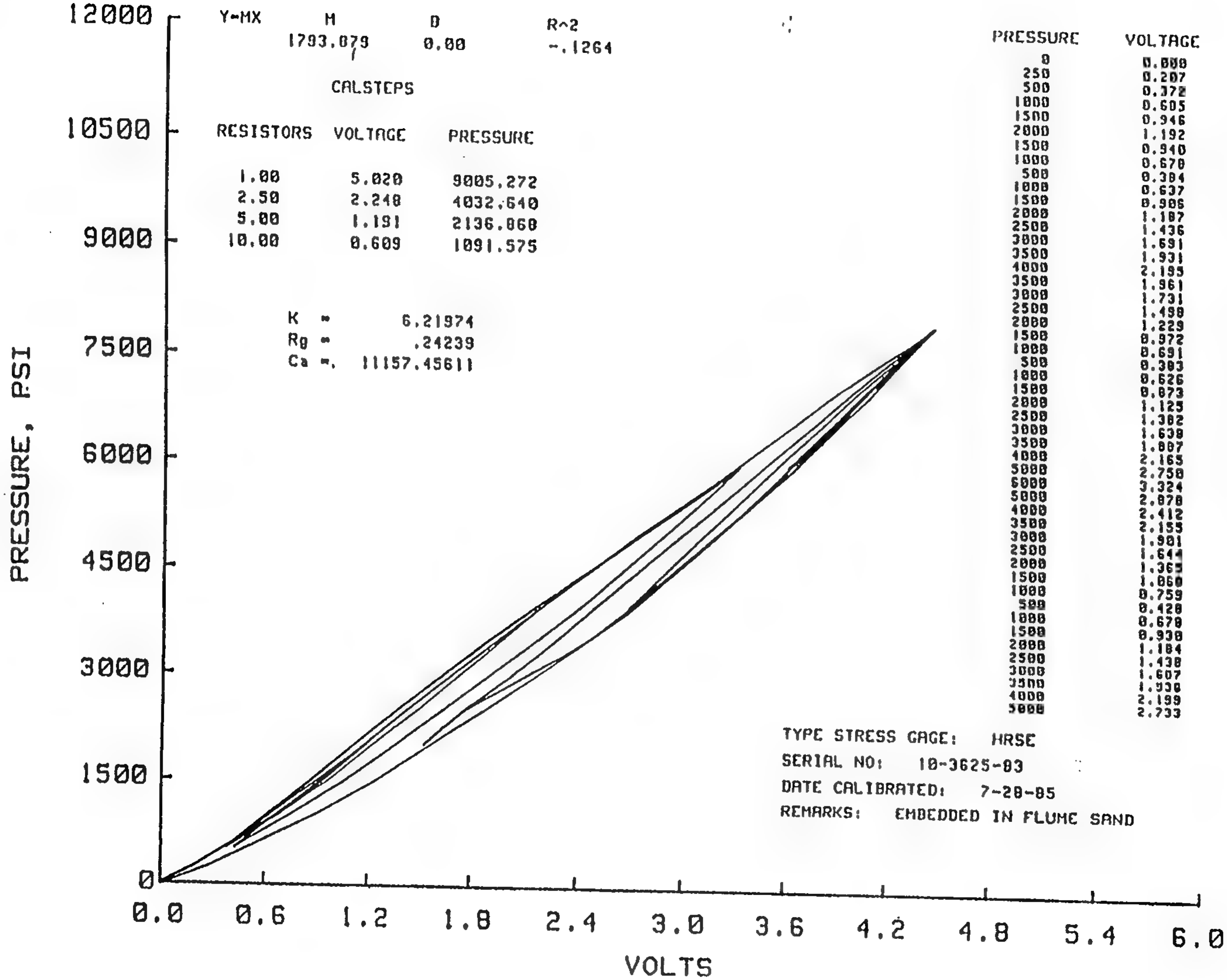
K = 6.35327
Rg = .26060
Ca = 13209.62435

PRESSURE	VOLTAGE
0	0.000
250	0.170
500	0.302
1000	0.550
1500	0.769
2000	0.976
1500	0.750
1000	0.533
500	0.295
1000	0.509
1500	0.731
2000	0.972
2500	1.195
3000	1.412
3500	1.626
4000	1.801
3500	1.676
3000	1.460
2500	1.261
2000	1.045
1500	0.810
1000	0.571
500	0.313
1000	0.510
1500	0.732
2000	0.947
2500	1.167
3000	1.385
3500	1.610
4000	1.840
5000	2.344
6000	2.875
5000	2.462
4000	2.065
3500	1.865
3000	1.641
2500	1.409
2000	1.176
1500	0.921
1000	0.651
500	0.358
1000	0.575
1500	0.797
2000	1.010
2500	1.230
3000	1.462
3500	1.679
4000	1.880
5000	2.350

PRESSURE	VOLTAGE
6000	2.830
7000	3.373
8000	3.902
7000	3.533
6000	3.135
7000	3.504
8000	3.920
7000	3.554
6000	3.191
5000	2.809
4000	2.362
5000	2.735
6000	3.116
7000	3.496

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3941-84
DATE CALIBRATED: 7-26-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 85



Y=MX	M	B	R^2
	1793.079	0.00	-.1264

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.020	9005.272
2.50	2.248	4032.640
5.00	1.191	2136.860
10.00	0.609	1091.575

K = 6.21974
Rg = .24239
Ca =. 11157.45611

PRESSURE	VOLTAGE
0	0.000
250	0.207
500	0.372
1000	0.605
1500	0.946
2000	1.192
1500	0.940
1000	0.670
500	0.384
1000	0.637
1500	0.906
2000	1.187
2500	1.436
3000	1.691
3500	1.931
4000	2.195
3500	1.961
3000	1.731
2500	1.498
2000	1.229
1500	0.972
1000	0.691
500	0.383
1000	0.626
1500	0.873
2000	1.125
2500	1.382
3000	1.638
3500	1.887
4000	2.165
5000	2.750
6000	3.324
5000	2.878
4000	2.412
3500	2.155
3000	1.901
2500	1.644
2000	1.365
1500	1.060
1000	0.759
500	0.428
1000	0.678
1500	0.938
2000	1.184
2500	1.438
3000	1.607
3500	1.938
4000	2.199
5000	2.733

PRESSURE	VOLTAGE
6000	3.310
7000	3.062
0000	4.470
7000	4.051
6000	3.607
7000	4.031
0000	4.467
7000	4.051
6000	3.645
5000	3.169
4000	2.686
5000	3.104
6000	3.539
7000	3.991
8000	4.474
7000	4.089
6000	3.616
5000	3.184
4000	2.718
3500	2.435
3000	2.109
2500	1.769
2000	1.527
2500	1.765
3000	2.030
3500	2.266
4000	2.493
5000	2.977
6000	3.466
7000	3.956
8000	4.461
7000	4.000
6000	3.650
5000	3.178
4000	2.693
3500	2.438
3000	2.166
2500	1.881
2000	1.567
1500	1.245
1000	0.900
500	0.500
250	0.291
0	0.025

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3625-83
DATE CALIBRATED: 7-28-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 86

Y=MX	M	B	R^2
	1063.203	0.00	-.1442

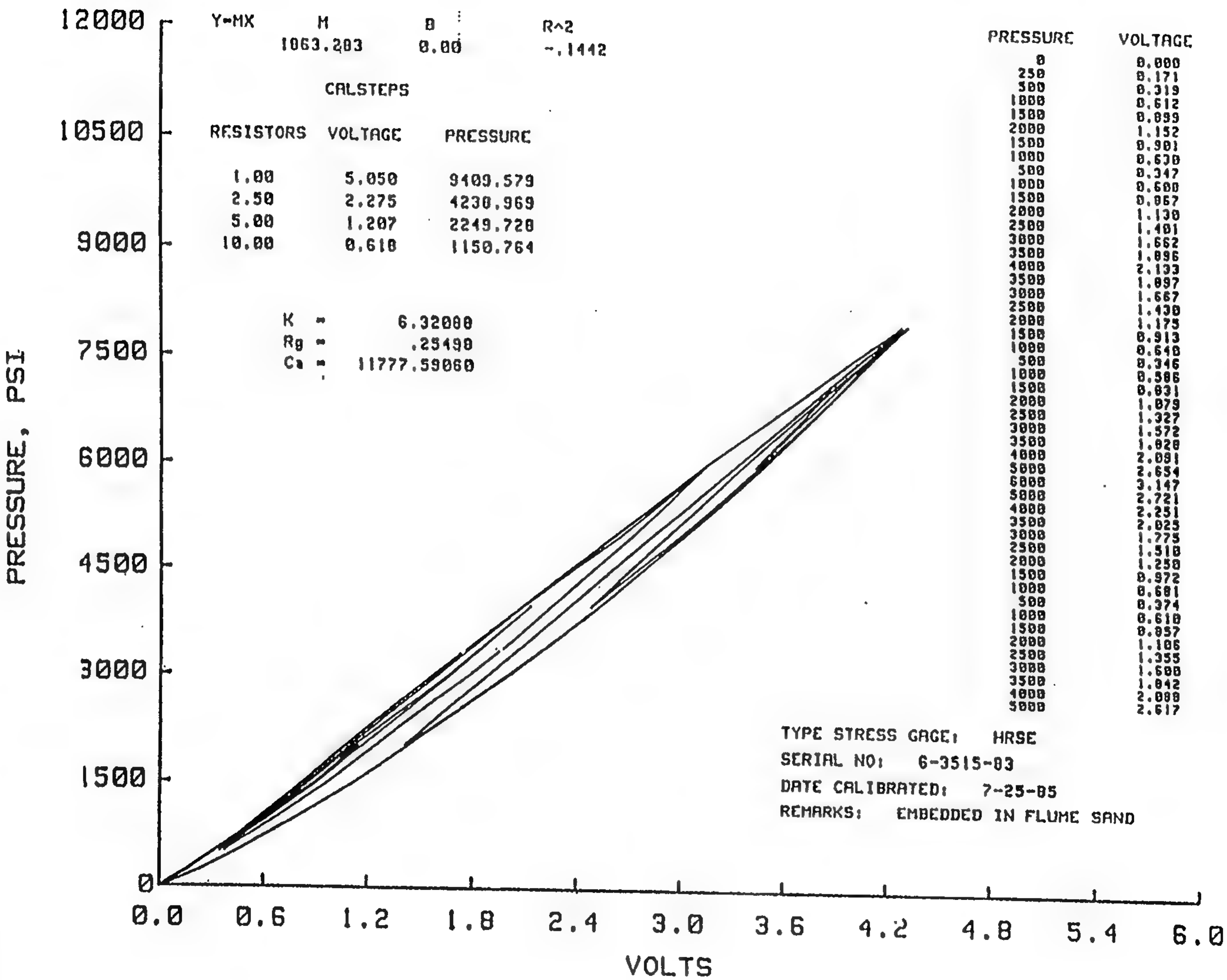
CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.050	9409.579
2.50	2.275	4230.969
5.00	1.207	2249.728
10.00	0.618	1150.764

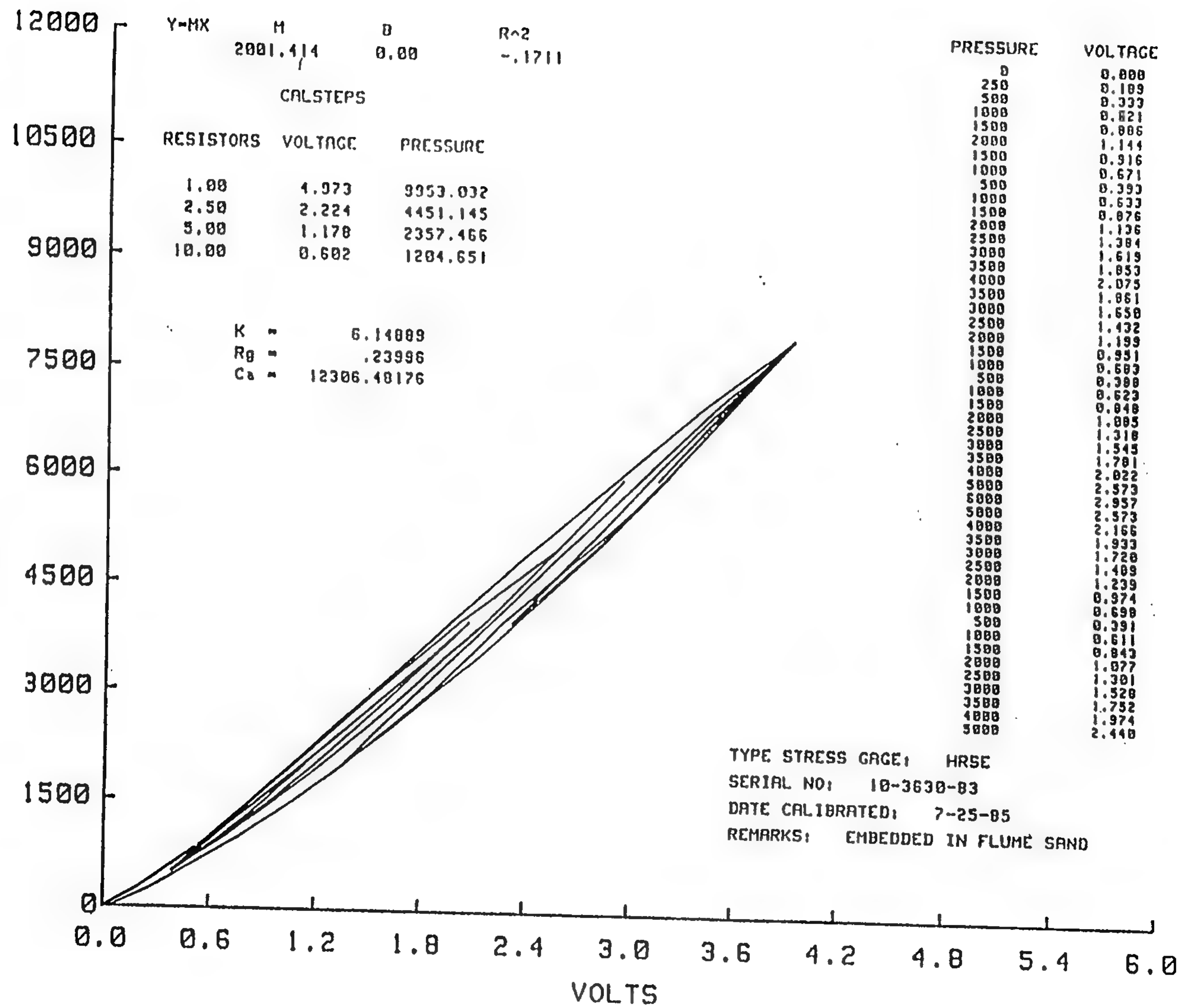
K = 6.32000
Rg = .25490
Ca = 11777.59060

PRESSURE	VOLTAGE
0	0.000
250	0.171
500	0.319
1000	0.612
1500	0.899
2000	1.152
1500	0.901
1000	0.630
500	0.347
1000	0.600
1500	0.867
2000	1.130
2500	1.401
3000	1.662
3500	1.896
4000	2.133
3500	1.897
3000	1.667
2500	1.430
2000	1.175
1500	0.913
1000	0.640
500	0.346
1000	0.586
1500	0.831
2000	1.079
2500	1.327
3000	1.572
3500	1.828
4000	2.081
5000	2.654
6000	3.147
5000	2.721
4000	2.251
3500	2.025
3000	1.775
2500	1.510
2000	1.250
1500	0.972
1000	0.681
500	0.374
1000	0.610
1500	0.857
2000	1.106
2500	1.355
3000	1.600
3500	1.842
4000	2.088
5000	2.617

PRESSURE	VOLTAGE
6000	3.139
7000	3.724
8000	4.294
7000	3.870
6000	3.435
7000	3.842
8000	4.323
7000	3.905
6000	3.455
5000	2.996
4000	2.479
5000	2.924
6000	3.360
7000	3.833
8000	4.332
7000	3.910
6000	3.486
5000	3.020
4000	2.530
3500	2.263
3000	1.991
2500	1.715
2000	1.415
2500	1.648
3000	1.884
3500	2.121
4000	2.357
5000	2.836
6000	3.319
7000	3.808
8000	4.299
7000	3.899
6000	3.466
5000	3.021
4000	2.519
3500	2.269
3000	2.083
2500	1.721
2000	1.430
1500	1.123
1000	0.798
500	0.445
250	0.244
0	0.015



TYPE STRESS GAGE: HRSE
SERIAL NO: 6-3515-83
DATE CALIBRATED: 7-25-85
REMARKS: EMBEDDED IN FLUME SAND



Y=MX	M	B	R^2
	2001.414	0.00	-.1711

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.973	9953.032
2.50	2.224	4451.145
5.00	1.178	2357.466
10.00	0.602	1204.651

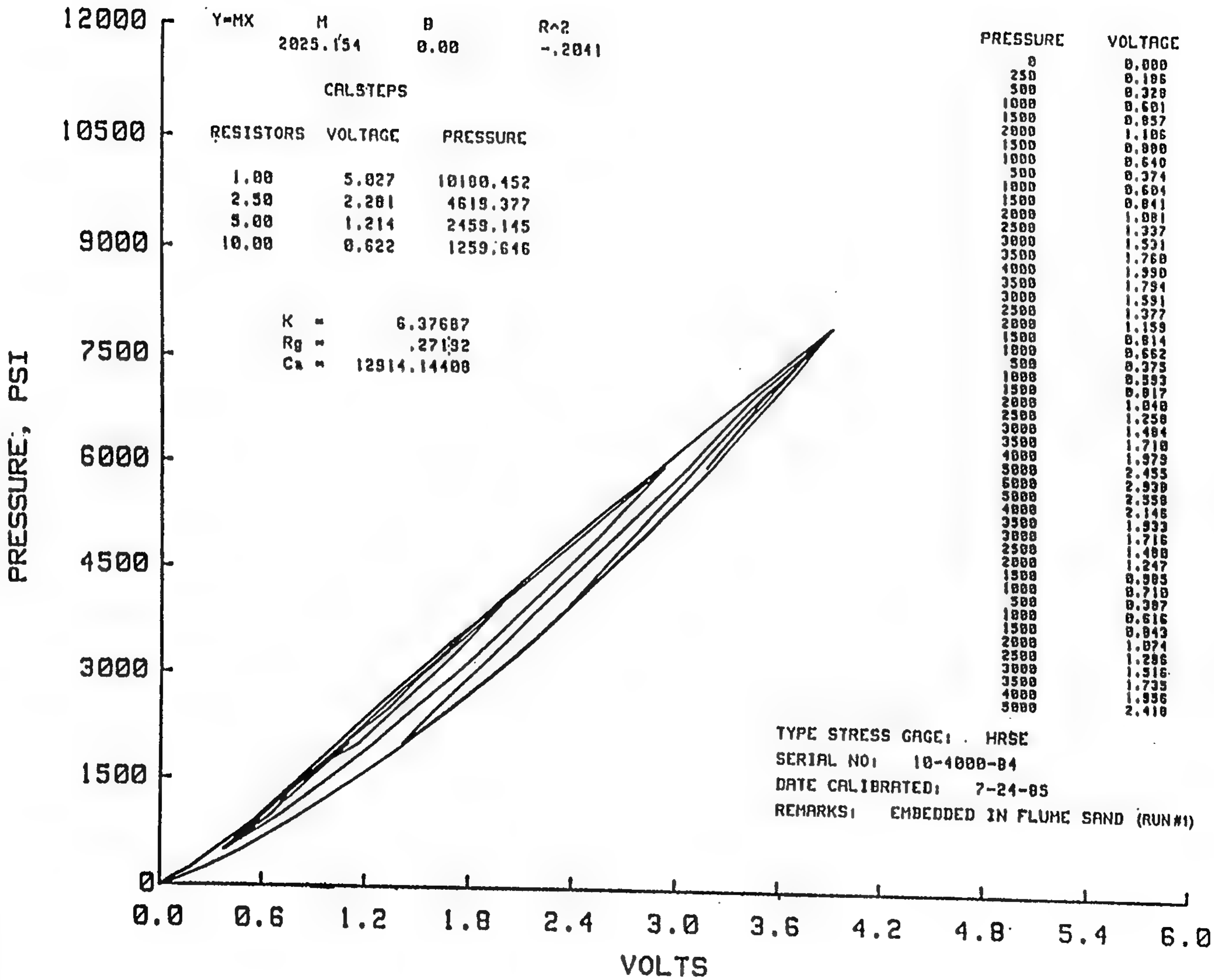
K = 6.14089
Rg = .23996
Ca = 12306.48176

PRESSURE	VOLTAGE
0	0.000
250	0.109
500	0.333
1000	0.621
1500	0.806
2000	1.144
1500	0.916
1000	0.671
500	0.393
1000	0.633
1500	0.876
2000	1.136
2500	1.384
3000	1.619
3500	1.853
4000	2.075
3500	1.861
3000	1.650
2500	1.432
2000	1.199
1500	0.951
1000	0.683
500	0.380
1000	0.623
1500	0.848
2000	1.085
2500	1.318
3000	1.545
3500	1.781
4000	2.022
5000	2.573
6000	2.957
5000	2.573
4000	2.166
3500	1.933
3000	1.720
2500	1.489
2000	1.239
1500	0.974
1000	0.690
500	0.391
1000	0.611
1500	0.843
2000	1.077
2500	1.301
3000	1.520
3500	1.752
4000	1.974
5000	2.440

PRESSURE	VOLTAGE
6000	2.920
7000	3.406
8000	3.930
7000	3.549
6000	3.156
7000	3.531
8000	3.942
7000	3.569
6000	3.104
5000	2.780
4000	2.318
5000	2.720
6000	3.106
7000	3.511
8000	3.946
7000	3.570
6000	3.197
5000	2.796
4000	2.344
3500	2.124
3000	1.875
2500	1.630
2000	1.360
2500	1.565
3000	1.770
3500	1.988
4000	2.201
5000	2.625
6000	3.053
7000	3.480
8000	3.942
7000	3.565
6000	3.201
5000	2.747
4000	2.264
3500	2.066
3000	1.850
2500	1.615
2000	1.363
1500	1.070
1000	0.770
500	0.431
250	0.257
0	0.032

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3630-83
DATE CALIBRATED: 7-25-85
REMARKS: EMBEDDED IN FLUME SAND

Plate 88



Y=MX	M	B	R^2
	2025.154	0.00	-.2041

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.027	10100.452
2.50	2.281	4619.377
5.00	1.214	2459.145
10.00	0.622	1259.646

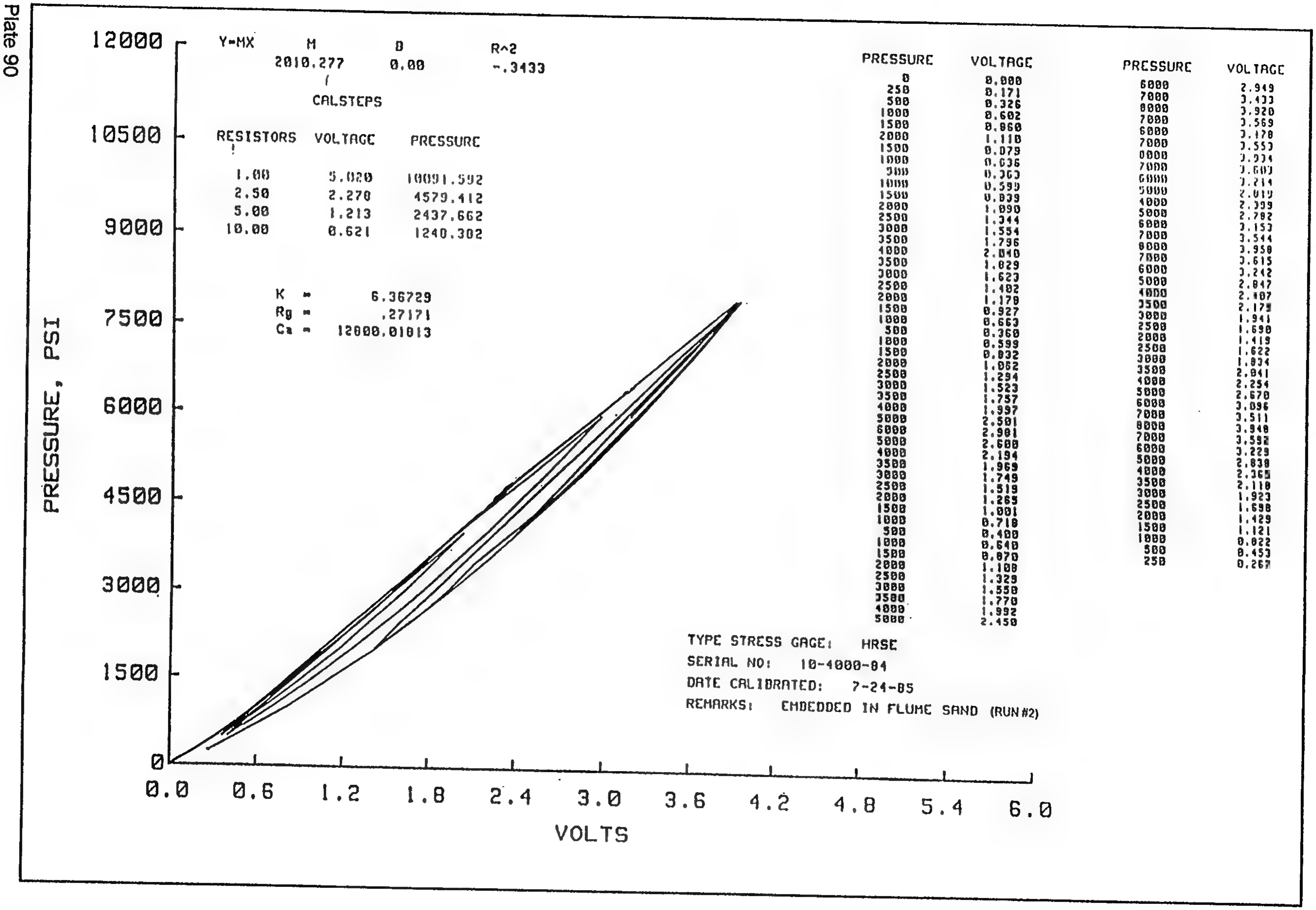
K = 6.37687
Rg = .27192
Ca = 12914.14400

PRESSURE	VOLTAGE
0	0.000
250	0.186
500	0.328
1000	0.601
1500	0.857
2000	1.106
1500	0.800
1000	0.640
500	0.374
1000	0.604
1500	0.841
2000	1.081
2500	1.337
3000	1.531
3500	1.760
4000	1.990
3500	1.794
3000	1.591
2500	1.377
2000	1.159
1500	0.814
1000	0.662
500	0.375
1000	0.593
1500	0.817
2000	1.040
2500	1.258
3000	1.484
3500	1.710
4000	1.979
5000	2.455
6000	2.930
5000	2.558
4000	2.146
3500	1.933
3000	1.716
2500	1.480
2000	1.247
1500	0.985
1000	0.710
500	0.387
1000	0.616
1500	0.843
2000	1.074
2500	1.286
3000	1.516
3500	1.735
4000	1.956
5000	2.410

PRESSURE	VOLTAGE
6000	2.916
7000	3.417
8000	3.915
7000	3.546
6000	3.179
7000	3.522
8000	3.933
7000	3.502
6000	3.207
5000	2.000
4000	2.381
5000	2.755
6000	3.123
7000	3.506
8000	3.930
7000	3.579
6000	3.210
5000	2.817
4000	2.386
3500	2.163
3000	1.938
2500	1.682
2000	1.412
2500	1.608
3000	1.818
3500	2.025
4000	2.229
5000	2.653
6000	3.074
7000	3.463
8000	3.931
7000	3.577
6000	3.213
5000	2.819
4000	2.397
3500	2.181
3000	1.946
2500	1.695
2000	1.431
1500	1.137
1000	0.826
500	0.483
250	0.272
0	0.022

TYPE STRESS GAGE: . HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 7-24-85
REMARKS: EMBEDDED IN FLUME SAND (RUN#1)

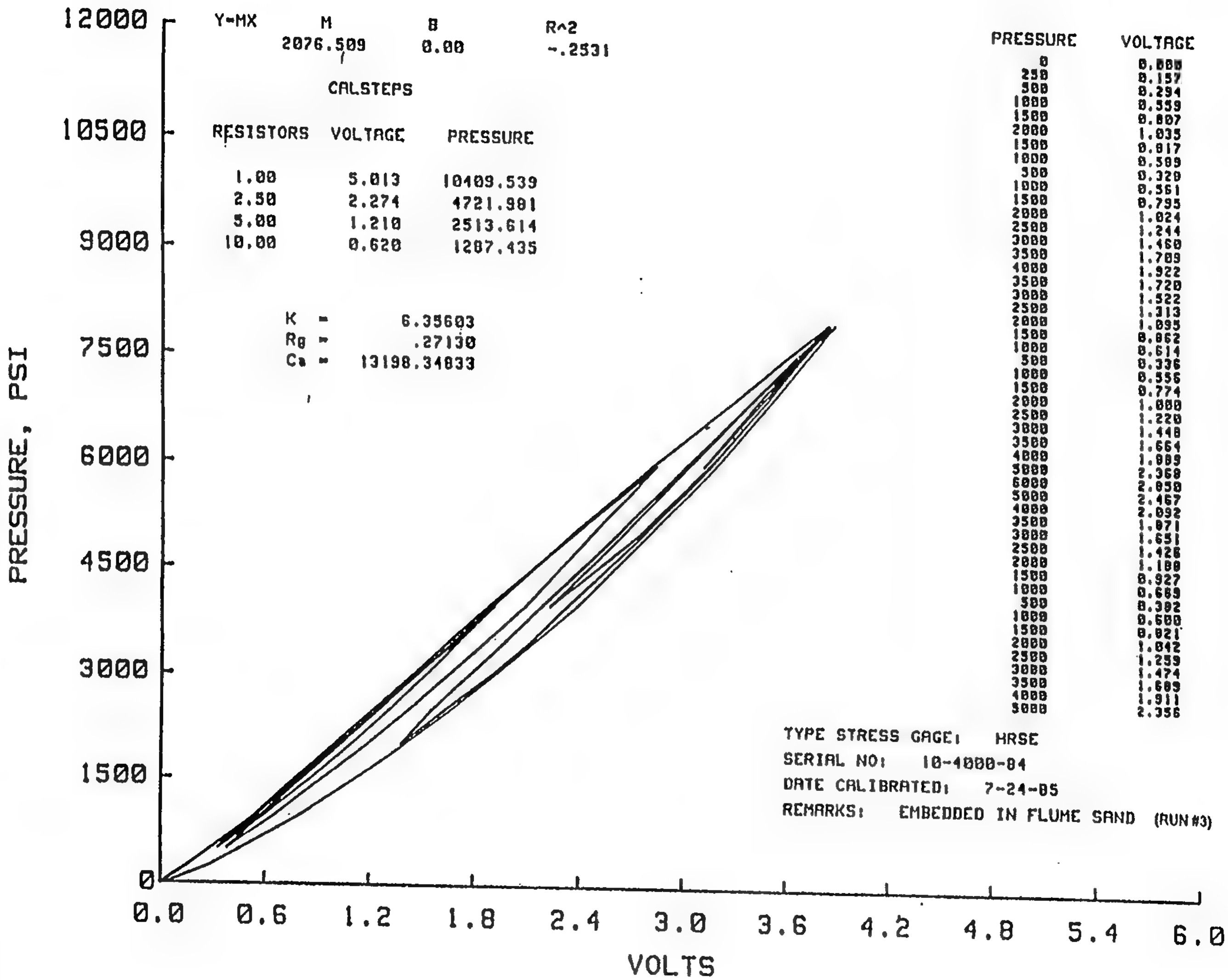
Plate 89



PRESSURE	VOLTAGE
0	0.000
250	0.171
500	0.326
1000	0.602
1500	0.860
2000	1.110
1500	0.879
1000	0.636
500	0.363
1000	0.599
1500	0.839
2000	1.090
2500	1.344
3000	1.554
3500	1.796
4000	2.040
3500	1.829
3000	1.623
2500	1.402
2000	1.178
1500	0.927
1000	0.663
500	0.360
1000	0.599
1500	0.832
2000	1.062
2500	1.294
3000	1.523
3500	1.757
4000	1.997
5000	2.501
6000	2.981
5000	2.600
4000	2.194
3500	1.969
3000	1.749
2500	1.519
2000	1.265
1500	1.001
1000	0.718
500	0.400
1000	0.640
1500	0.870
2000	1.108
2500	1.329
3000	1.558
3500	1.770
4000	1.992
5000	2.450

PRESSURE	VOLTAGE
6000	2.949
7000	3.433
8000	3.920
7000	3.569
6000	3.178
7000	3.553
8000	3.934
7000	3.603
6000	3.214
5000	2.819
4000	2.399
5000	2.782
6000	3.153
7000	3.544
8000	3.958
7000	3.615
6000	3.242
5000	2.847
4000	2.407
3500	2.179
3000	1.941
2500	1.698
2000	1.419
2500	1.622
3000	1.834
3500	2.041
4000	2.254
5000	2.670
6000	3.096
7000	3.511
8000	3.948
7000	3.592
6000	3.229
5000	2.838
4000	2.365
3500	2.118
3000	1.923
2500	1.698
2000	1.429
1500	1.121
1000	0.822
500	0.453
250	0.267

Plate 90



Y=MX	M	B	R^2
	2076.509	0.00	-.2531

CALSTEPS

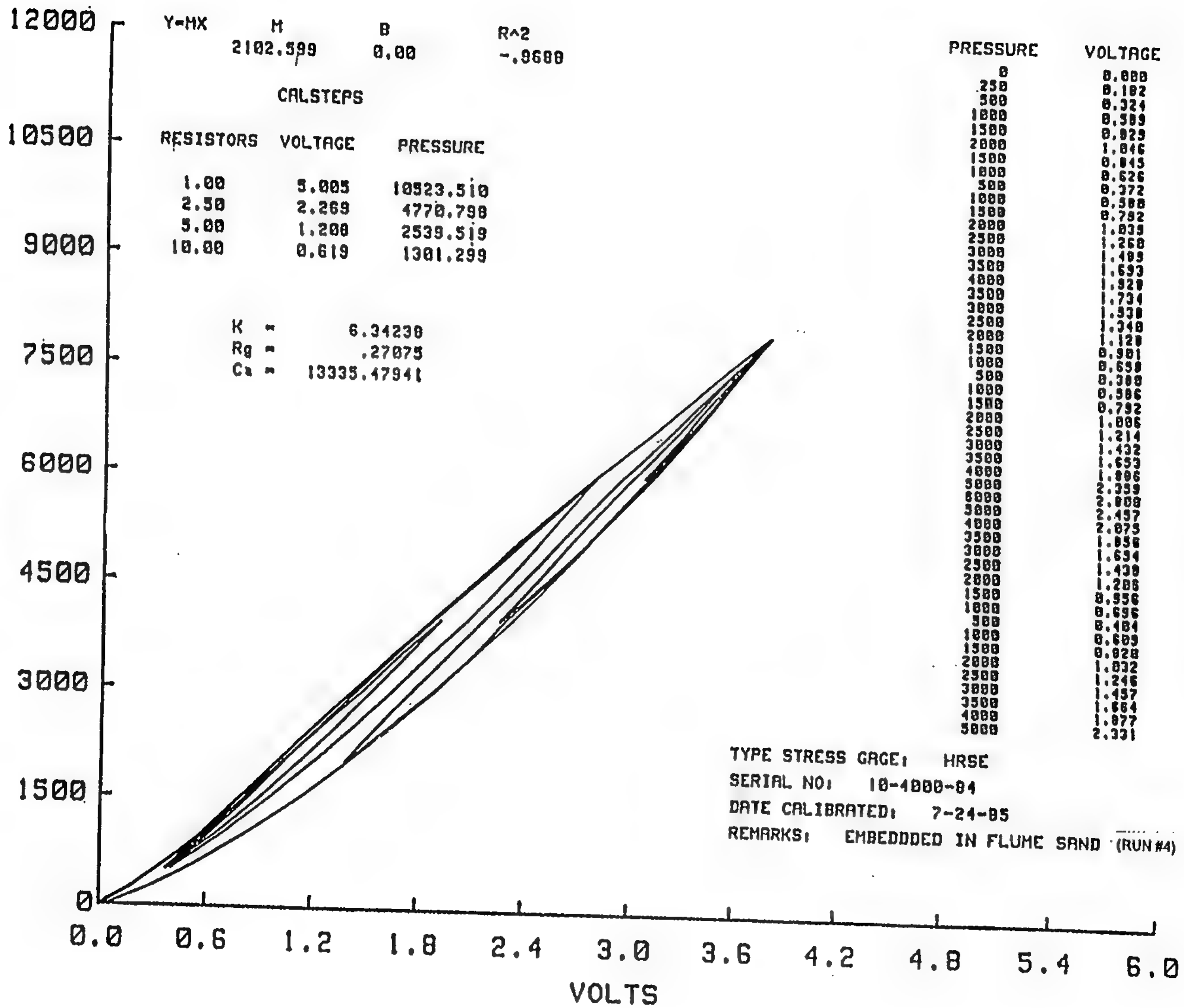
RESISTORS	VOLTAGE	PRESSURE
1.00	5.013	10409.539
2.50	2.274	4721.981
5.00	1.210	2513.614
10.00	0.620	1287.435

K = 6.35603
Rg = .27130
Ca = 13198.34833

PRESSURE	VOLTAGE
0	0.000
250	0.157
500	0.294
1000	0.559
1500	0.807
2000	1.035
1500	0.817
1000	0.589
500	0.320
1000	0.561
1500	0.795
2000	1.024
2500	1.244
3000	1.460
3500	1.709
4000	1.922
3500	1.720
3000	1.522
2500	1.313
2000	1.095
1500	0.862
1000	0.614
500	0.336
1000	0.556
1500	0.774
2000	1.000
2500	1.220
3000	1.448
3500	1.664
4000	1.889
5000	2.368
6000	2.858
5000	2.467
4000	2.092
3500	1.871
3000	1.651
2500	1.426
2000	1.188
1500	0.927
1000	0.669
500	0.382
1000	0.600
1500	0.821
2000	1.042
2500	1.259
3000	1.474
3500	1.689
4000	1.911
5000	2.356

PRESSURE	VOLTAGE
6000	2.873
7000	3.341
8000	3.848
7000	3.492
6000	3.115
7000	3.478
8000	3.865
7000	3.516
6000	3.140
5000	2.742
4000	2.238
5000	2.649
6000	3.032
7000	3.435
8000	3.856
7000	3.514
6000	3.155
5000	2.765
4000	2.327
3500	2.123
3000	1.890
2500	1.633
2000	1.380
2500	1.560
3000	1.772
3500	1.982
4000	2.186
5000	2.617
6000	3.013
7000	3.435
8000	3.891
7000	3.544
6000	3.187
5000	2.795
4000	2.383
3500	2.147
3000	1.912
2500	1.687
2000	1.404
1500	1.115
1000	0.814
500	0.462
250	0.283
0	0.025

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 7-24-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #3)



Y=MX	M	B	R^2
	2102.599	0.00	-.9680

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.005	10523.510
2.50	2.269	4770.798
5.00	1.208	2539.519
10.00	0.619	1301.299

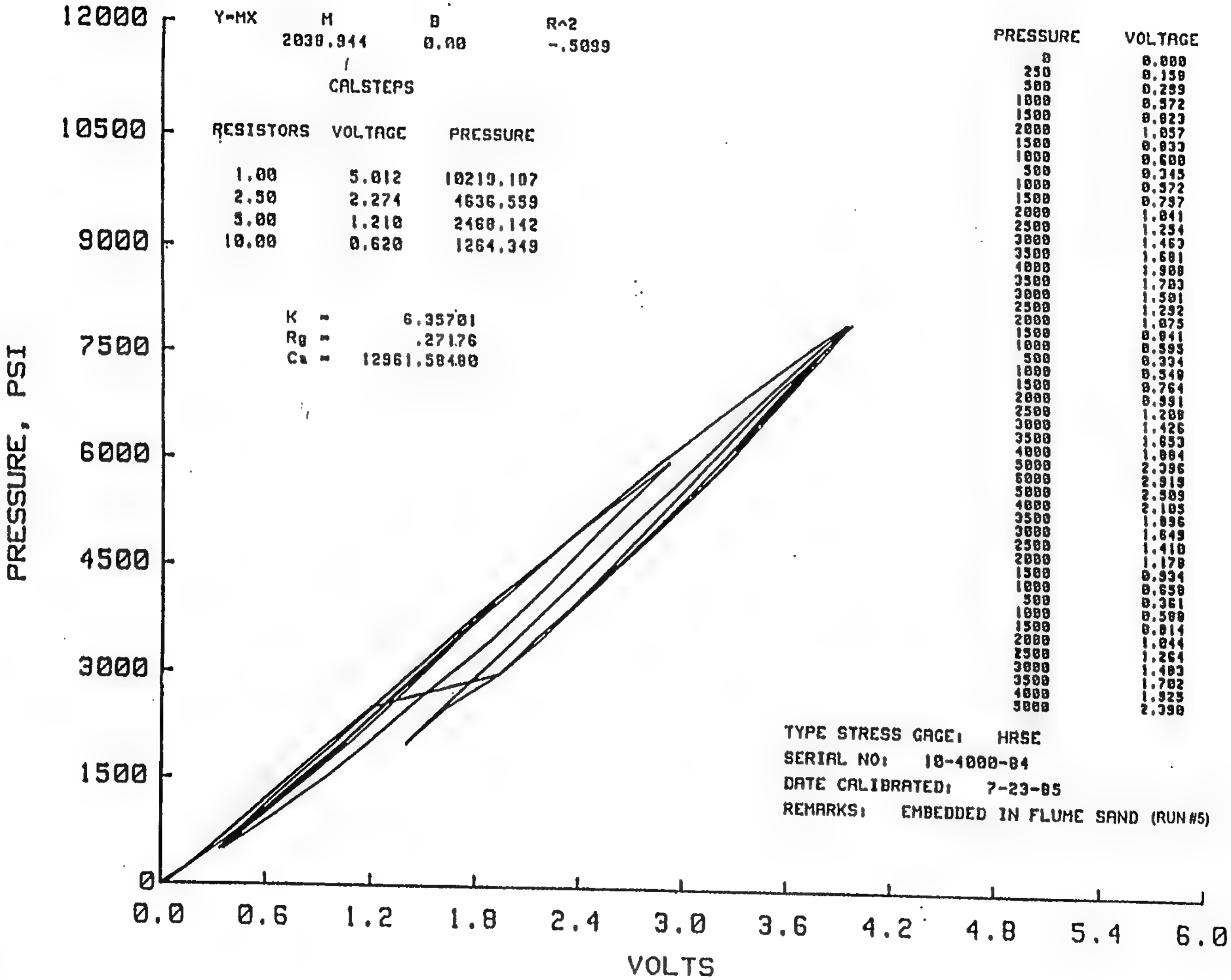
K = 6.34230
Rg = .27075
Cs = 13335.47941

PRESSURE	VOLTAGE
0	0.000
250	0.102
500	0.324
1000	0.509
1500	0.829
2000	1.046
1500	0.845
1000	0.626
500	0.372
1000	0.580
1500	0.792
2000	1.039
2500	1.260
3000	1.485
3500	1.693
4000	1.920
3500	1.734
3000	1.530
2500	1.340
2000	1.120
1500	0.901
1000	0.659
500	0.380
1000	0.586
1500	0.792
2000	1.006
2500	1.214
3000	1.432
3500	1.653
4000	1.806
5000	2.359
6000	2.800
5000	2.457
4000	2.075
3500	1.850
3000	1.634
2500	1.430
2000	1.208
1500	0.950
1000	0.696
500	0.404
1000	0.609
1500	0.828
2000	1.032
2500	1.246
3000	1.457
3500	1.664
4000	1.877
5000	2.331

PRESSURE	VOLTAGE
8000	2.794
7000	3.203
8000	3.700
7000	3.444
6000	3.066
7000	3.419
8000	3.800
7000	3.455
6000	3.080
5000	2.725
4000	2.250
5000	2.633
6000	3.003
7000	3.389
8000	3.789
7000	3.466
6000	3.185
5000	2.731
4000	2.324
3500	2.188
3000	1.883
2500	1.640
2000	1.384
2500	1.572
3000	1.760
3500	1.960
4000	2.165
5000	2.568
6000	2.945
7000	3.360
8000	3.807
7000	3.466
6000	3.110
5000	2.726
4000	2.285
3500	2.104
3000	1.894
2500	1.658
2000	1.402
1500	1.125
1000	0.823
500	0.404
250	0.285
0	0.035

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 7-24-85
REMARKS: EMBEDDDED IN FLUME SAND (RUN #4)

Plate 92



Y=MX	M	B	R^2
	2030.944	0.00	-.5099

/
CALSTEPS

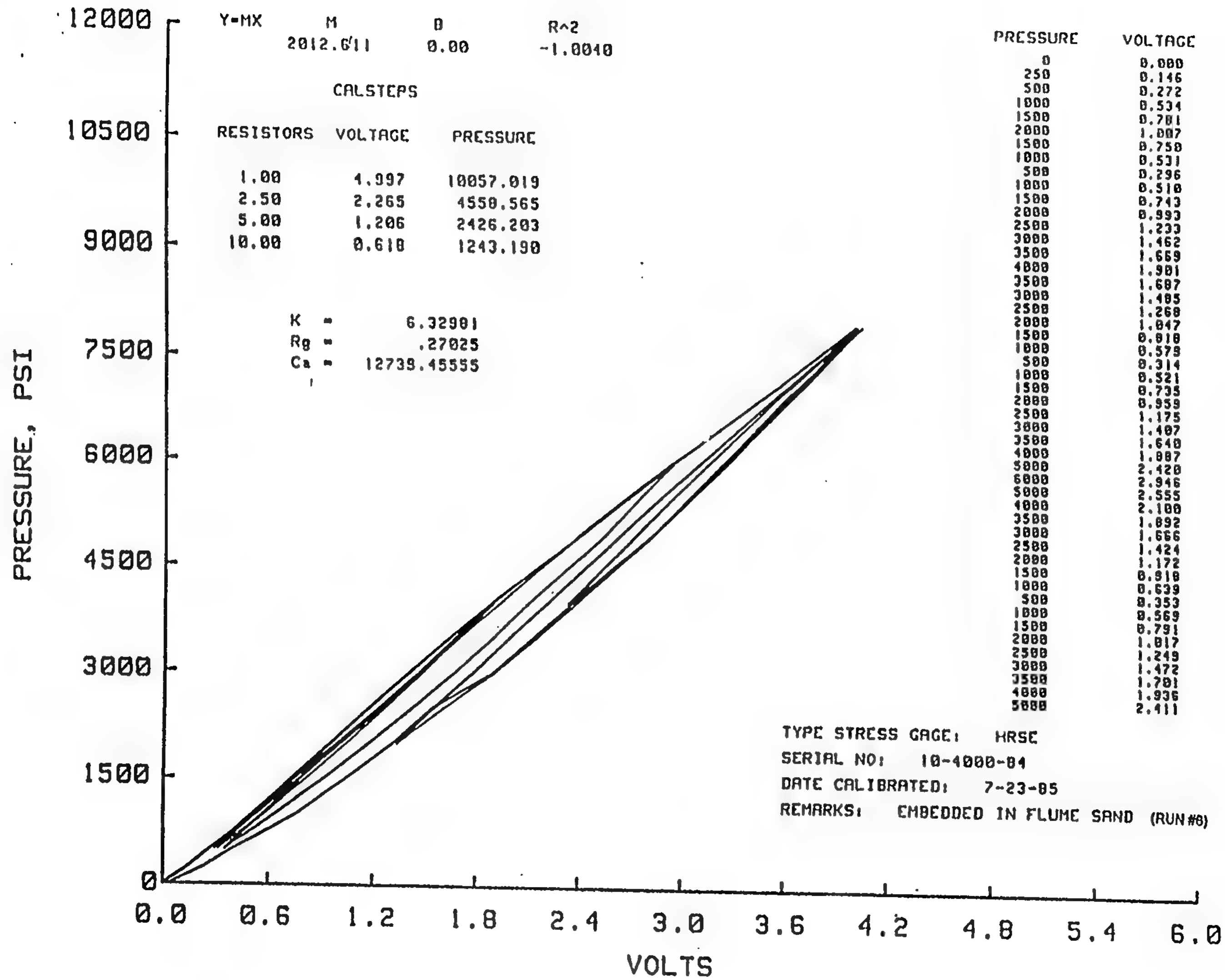
RESISTORS	VOLTAGE	PRESSURE
1.00	5.012	10219.107
2.50	2.274	4636.559
5.00	1.210	2468.142
10.00	0.620	1264.349

K = 6.35701
Rg = .27176
Ca = 12961.58400

PRESSURE	VOLTAGE
0	0.000
250	0.150
500	0.259
1000	0.572
1500	0.823
2000	1.057
1500	0.833
1000	0.600
500	0.345
1000	0.572
1500	0.797
2000	1.041
2500	1.254
3000	1.463
3500	1.681
4000	1.900
3500	1.703
3000	1.501
2500	1.292
2000	1.075
1500	0.841
1000	0.595
500	0.334
1000	0.549
1500	0.764
2000	0.991
2500	1.208
3000	1.426
3500	1.653
4000	1.884
5000	2.396
6000	2.919
5000	2.509
4000	2.105
3500	1.896
3000	1.649
2500	1.410
2000	1.178
1500	0.934
1000	0.658
500	0.361
1000	0.580
1500	0.814
2000	1.044
2500	1.264
3000	1.483
3500	1.702
4000	1.925
5000	2.390

PRESSURE	VOLTAGE
6000	2.865
7000	3.390
8000	3.943
7000	3.600
6000	3.200
7000	3.569
8000	3.962
7000	3.585
6000	3.207
5000	2.814
4000	2.372
5000	2.775
6000	3.150
7000	3.530
8000	3.979
7000	3.619
6000	3.250
5000	2.840
4000	2.387
3500	2.174
3000	1.934
2500	1.627
2000	1.398
2500	1.611
3000	1.817
3500	2.034
4000	2.241
5000	2.660
6000	3.080
7000	3.506
8000	3.949
7000	3.596
6000	3.236
5000	2.827
4000	2.373
3500	2.143
3000	1.931
2500	1.199
2000	0.960
1500	0.732
1000	0.506
500	0.271
250	0.154
0	0.020

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 7-23-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #5)



Y=MX	M	B	R^2
	2012.611	0.00	-1.0040

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.997	10057.019
2.50	2.265	4550.565
5.00	1.206	2426.203
10.00	0.618	1243.190

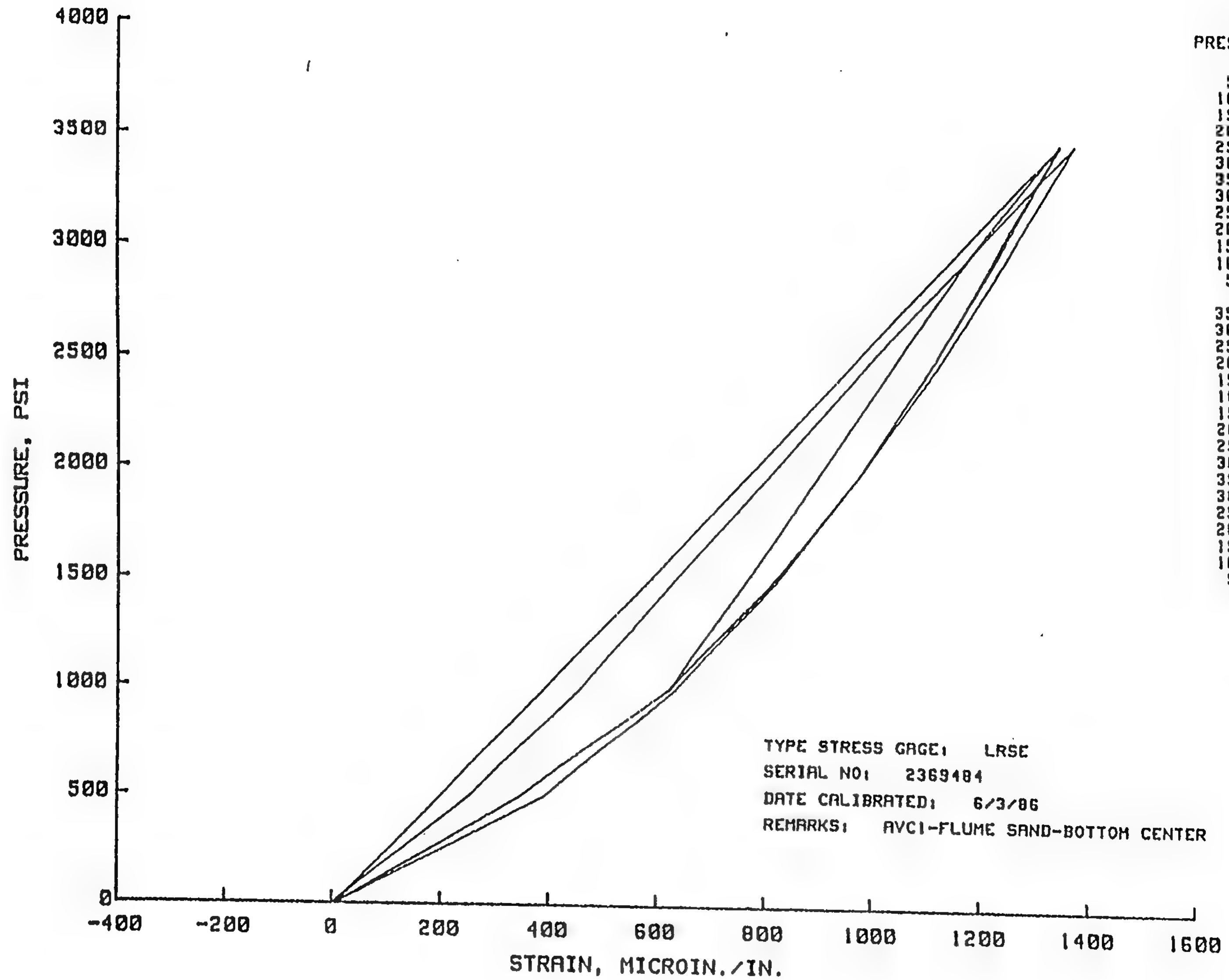
K = 6.32981
Rg = .27025
Ca = 12739.45555

PRESSURE	VOLTAGE
0	0.000
250	0.146
500	0.272
1000	0.534
1500	0.781
2000	1.007
1500	0.758
1000	0.531
500	0.296
1000	0.510
1500	0.743
2000	0.993
2500	1.233
3000	1.462
3500	1.669
4000	1.901
3500	1.687
3000	1.485
2500	1.268
2000	1.047
1500	0.818
1000	0.579
500	0.314
1000	0.521
1500	0.735
2000	0.959
2500	1.175
3000	1.407
3500	1.640
4000	1.887
5000	2.420
6000	2.946
5000	2.555
4000	2.100
3500	1.892
3000	1.666
2500	1.424
2000	1.172
1500	0.918
1000	0.639
500	0.353
1000	0.569
1500	0.791
2000	1.017
2500	1.249
3000	1.472
3500	1.701
4000	1.936
5000	2.411

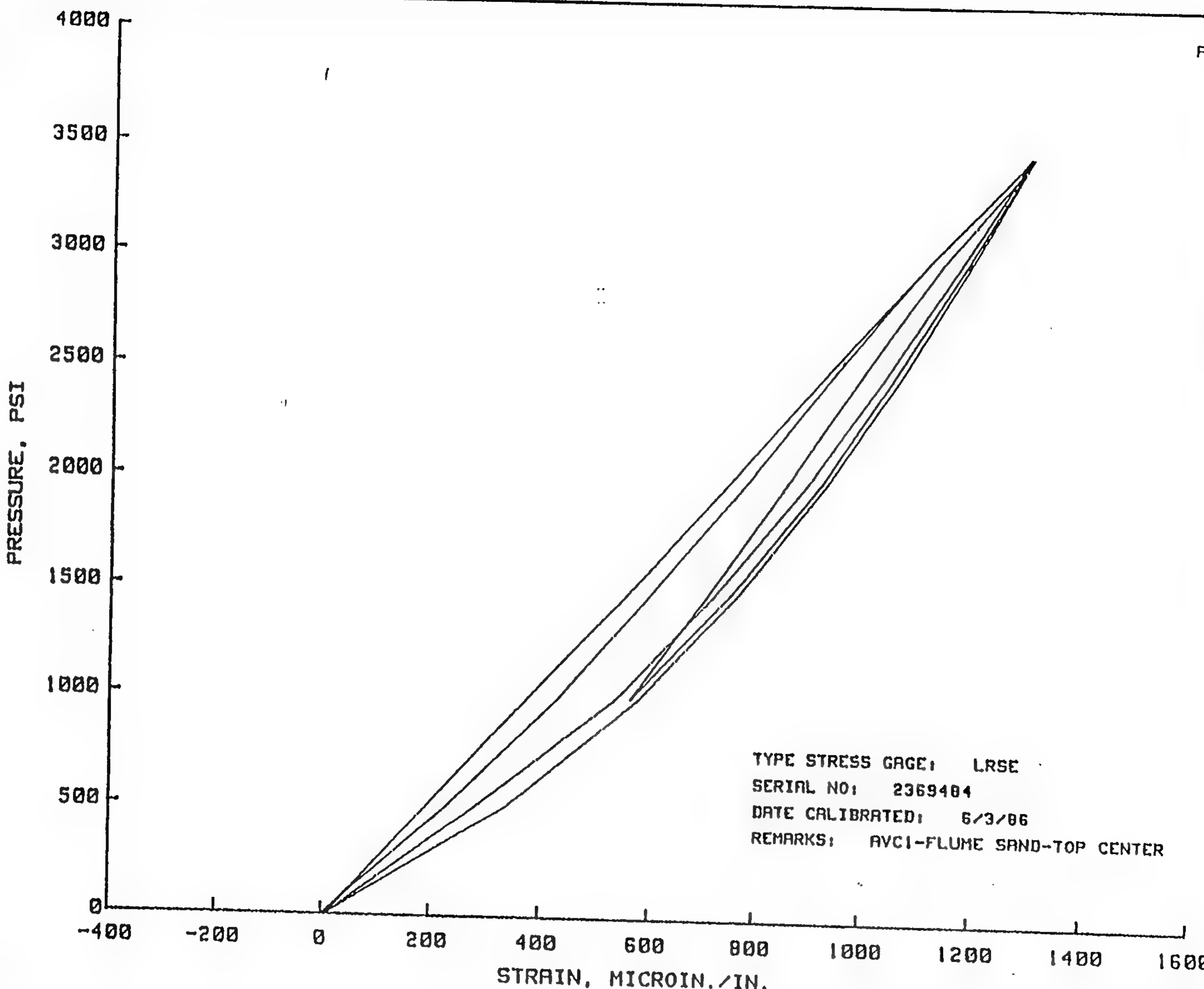
PRESSURE	VOLTAGE
6000	2.935
7000	3.400
8000	4.000
7000	3.635
6000	3.233
7000	3.615
8000	4.050
7000	3.656
6000	3.251
5000	2.831
4000	2.331
5000	2.737
6000	3.147
7000	3.572
8000	4.026
7000	3.651
6000	3.227
5000	2.833
4000	2.370
3500	2.145
3000	1.897
2500	1.603
2000	1.335
2500	1.546
3000	1.775
3500	1.989
4000	2.210
5000	2.646
6000	3.095
7000	3.553
8000	4.018
7000	3.635
6000	3.261
5000	2.833
4000	2.352
3500	2.120
3000	1.887
2500	1.537
2000	1.309
1500	1.041
1000	0.760
500	0.398
250	0.236
0	0.038

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-4000-84
DATE CALIBRATED: 7-23-85
REMARKS: EMBEDDED IN FLUME SAND (RUN #8)

Plate 94

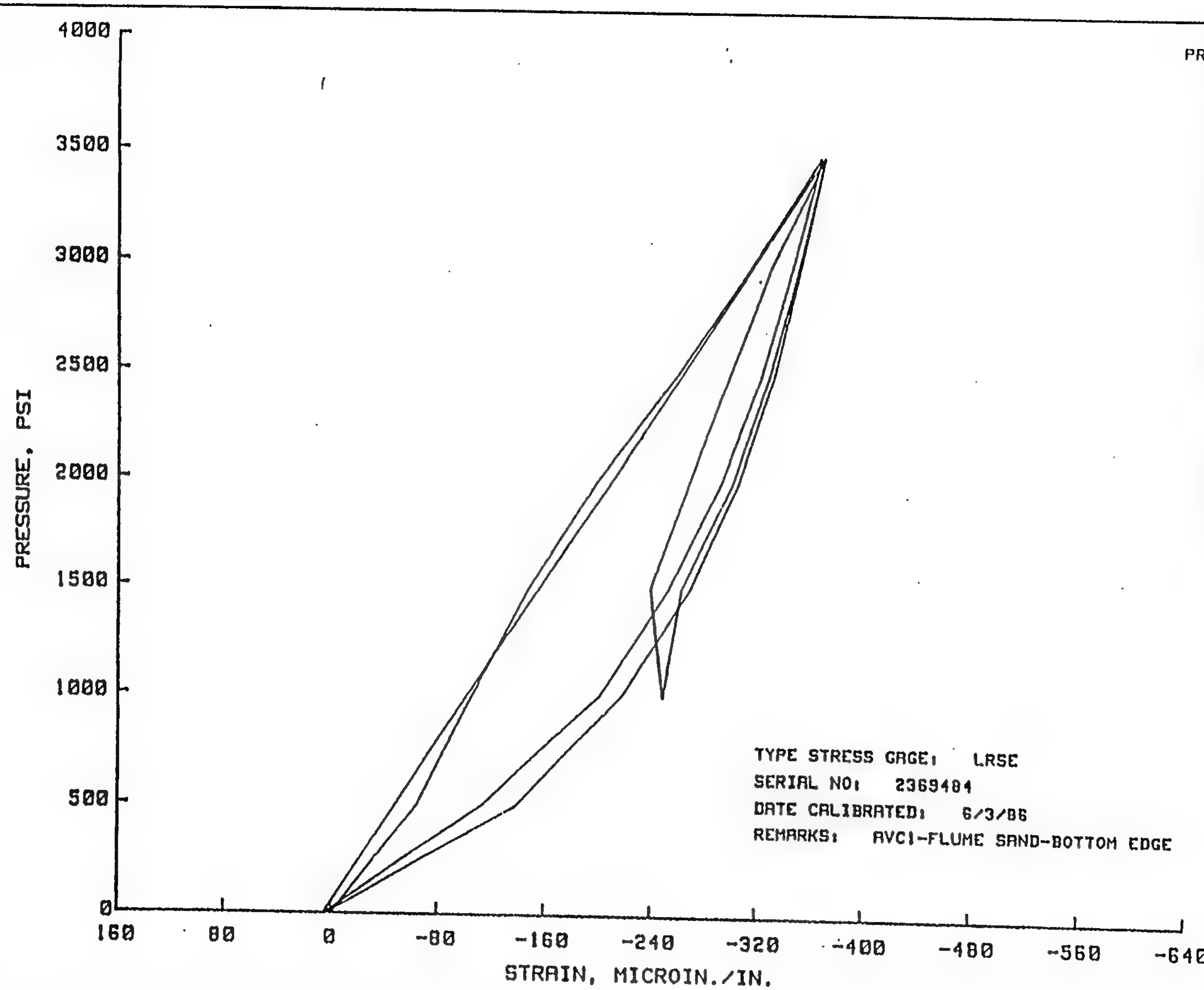


PRESSURE	STRAIN
0	0.0
500	252.2
1000	457.0
1500	630.9
2000	814.3
2500	996.5
3000	1187.4
3500	1378.7
3000	1255.7
2500	1127.0
2000	980.9
1500	811.7
1000	619.6
500	346.1
0	7.0
3500	1352.2
3000	1237.0
2500	1115.2
2000	979.1
1500	815.2
1000	622.6
1500	763.9
2000	904.0
2500	1045.7
3000	1187.0
3500	1350.9
3000	1232.2
2500	1115.7
2000	979.1
1500	820.4
1000	633.0
500	390.0
0	6.1

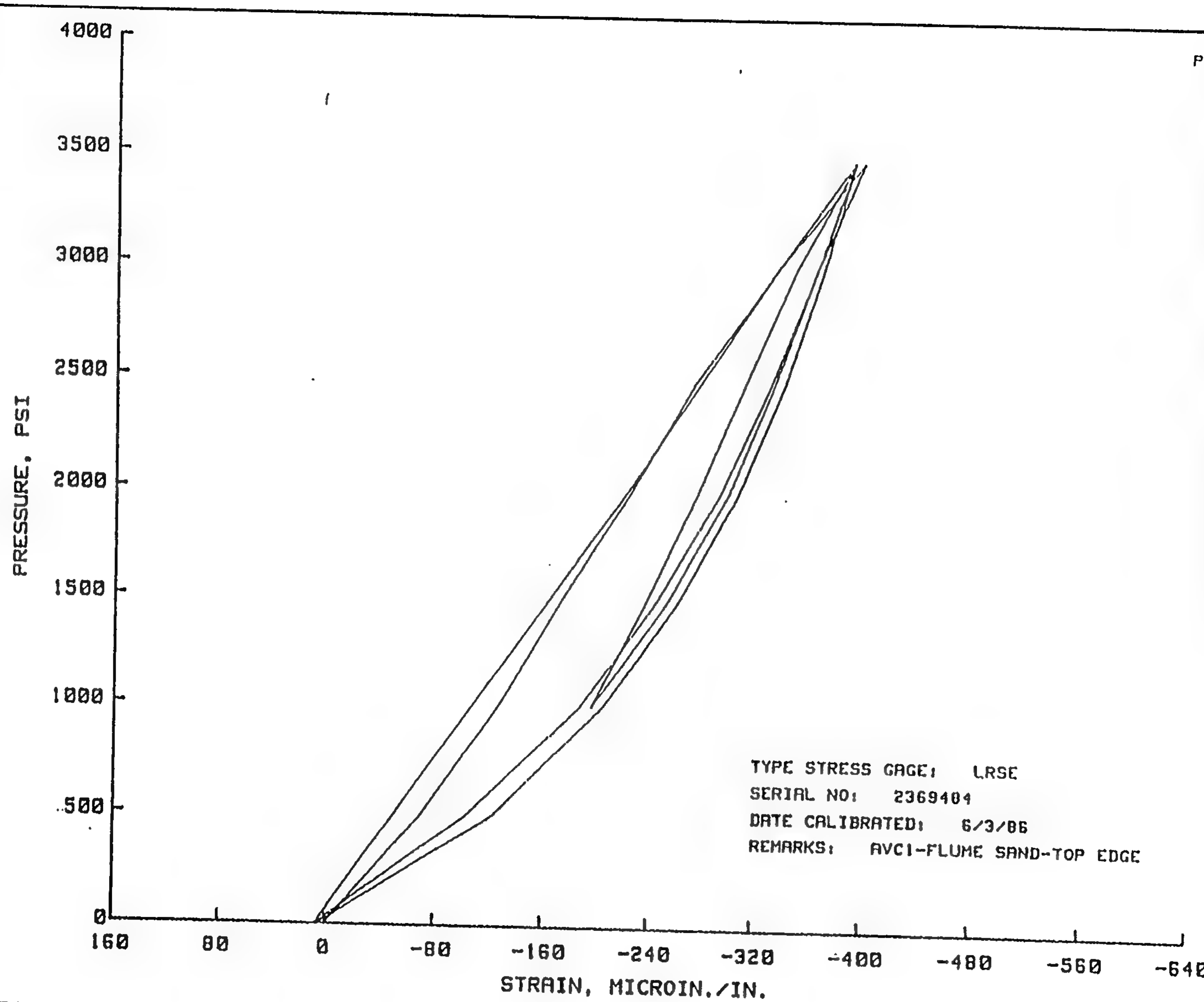


PRESSURE	STRAIN
0	0.0
500	230.0
1000	433.0
1500	605.2
2000	701.7
2500	948.3
3000	1119.1
3500	1301.7
3000	1177.0
2500	1045.2
2000	897.0
1500	726.5
1000	537.0
500	201.7
0	7.0
3500	1304.0
3000	1108.3
2500	1062.2
2000	922.6
1500	756.1
1000	563.5
1500	713.5
2000	859.1
2500	1001.7
3000	1143.7
3500	1308.7
3000	1194.0
2500	1074.0
2000	933.0
1500	770.0
1000	578.7
500	336.1
0	5.7

Plate 96

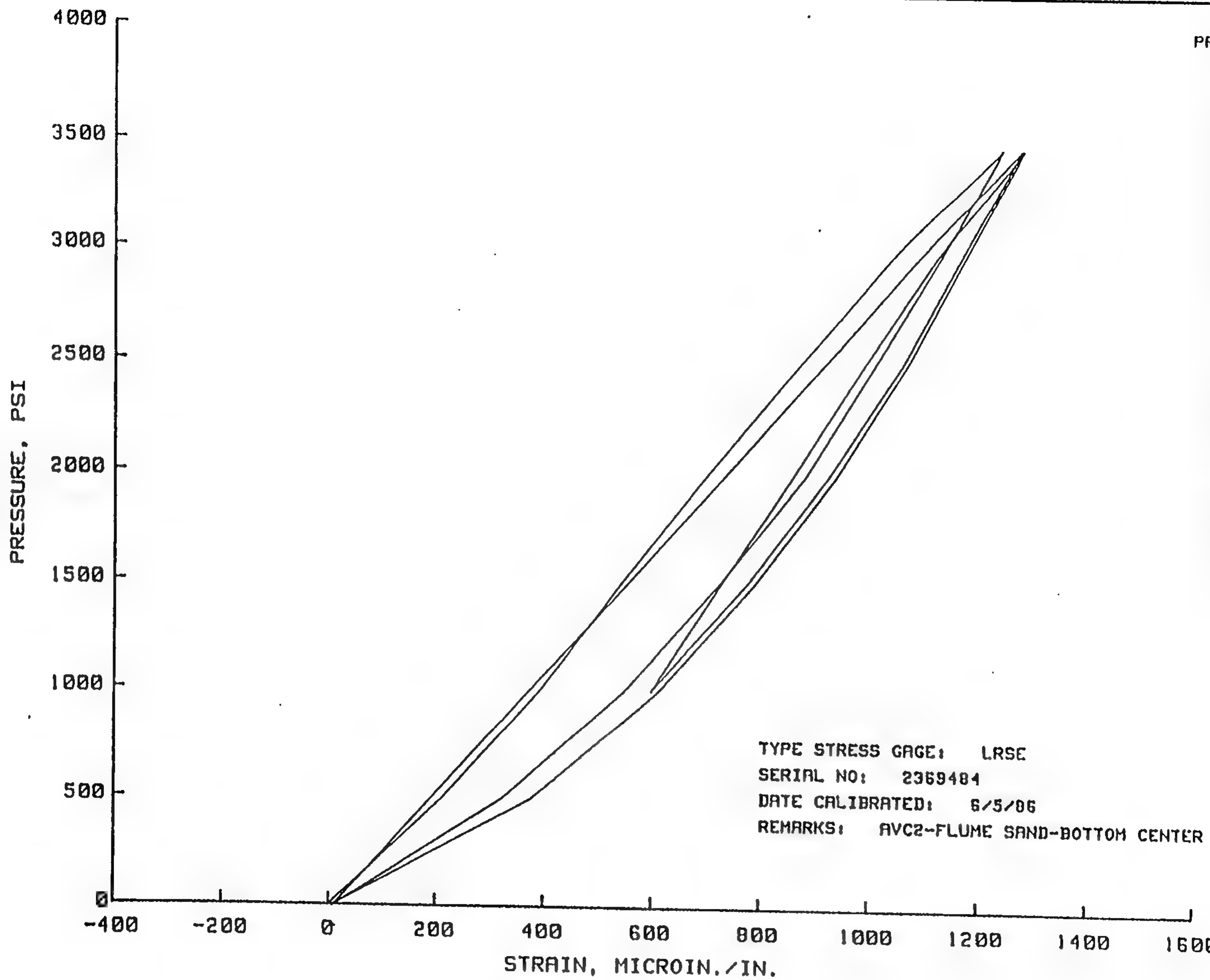


PRESSURE	STRAIN
0	0.0
500	-64.8
1000	-106.1
1500	-148.7
2000	-199.6
2500	-260.4
3000	-317.0
3500	-369.6
3000	-347.8
2500	-323.9
2000	-293.5
1500	-253.0
1000	-200.4
500	-113.8
0	5.7
3500	-372.2
3000	-352.6
2500	-330.0
2000	-302.2
1500	-263.0
1000	-240.7
1500	-239.1
2000	-269.6
2500	-300.4
3000	-332.2
3500	-372.6
3000	-353.9
2500	-333.5
2000	-306.5
1500	-269.6
1000	-217.0
500	-130.7
0	3.9



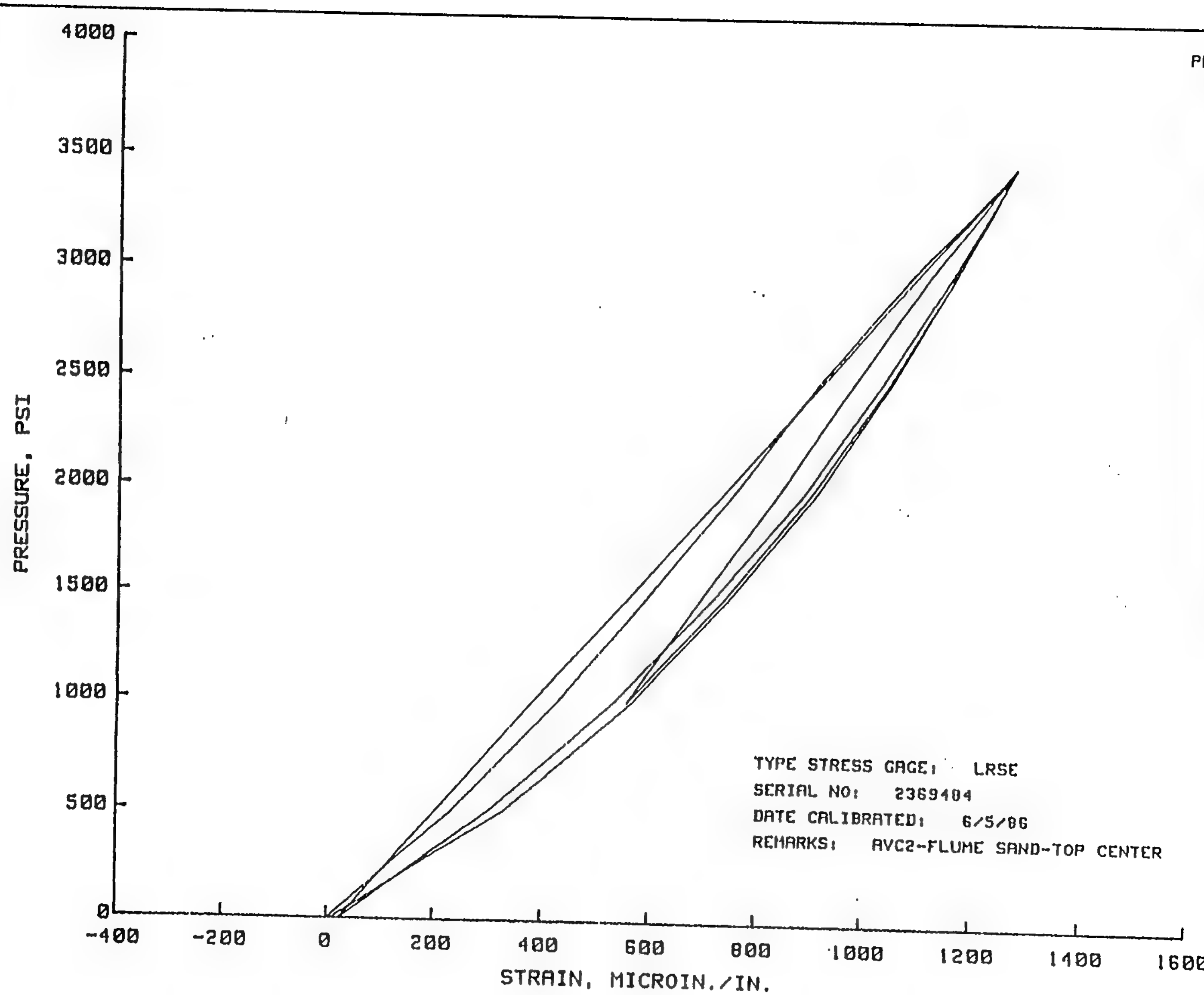
PRESSURE	STRAIN
0	0.0
500	-70.0
1000	-127.0
1500	-173.9
2000	-224.0
2500	-274.0
3000	-336.1
3500	-400.9
3000	-365.2
2500	-332.2
2000	-293.5
1500	-245.2
1000	-187.4
500	-103.0
0	7.4
3500	-393.5
3000	-365.7
2500	-334.0
2000	-300.0
1500	-253.9
1000	-196.1
1500	-237.0
2000	-276.5
2500	-313.0
3000	-350.4
3500	-393.9
3000	-370.4
2500	-342.6
2000	-307.4
1500	-262.2
1000	-204.3
500	-122.6
0	5.7

Plate 98



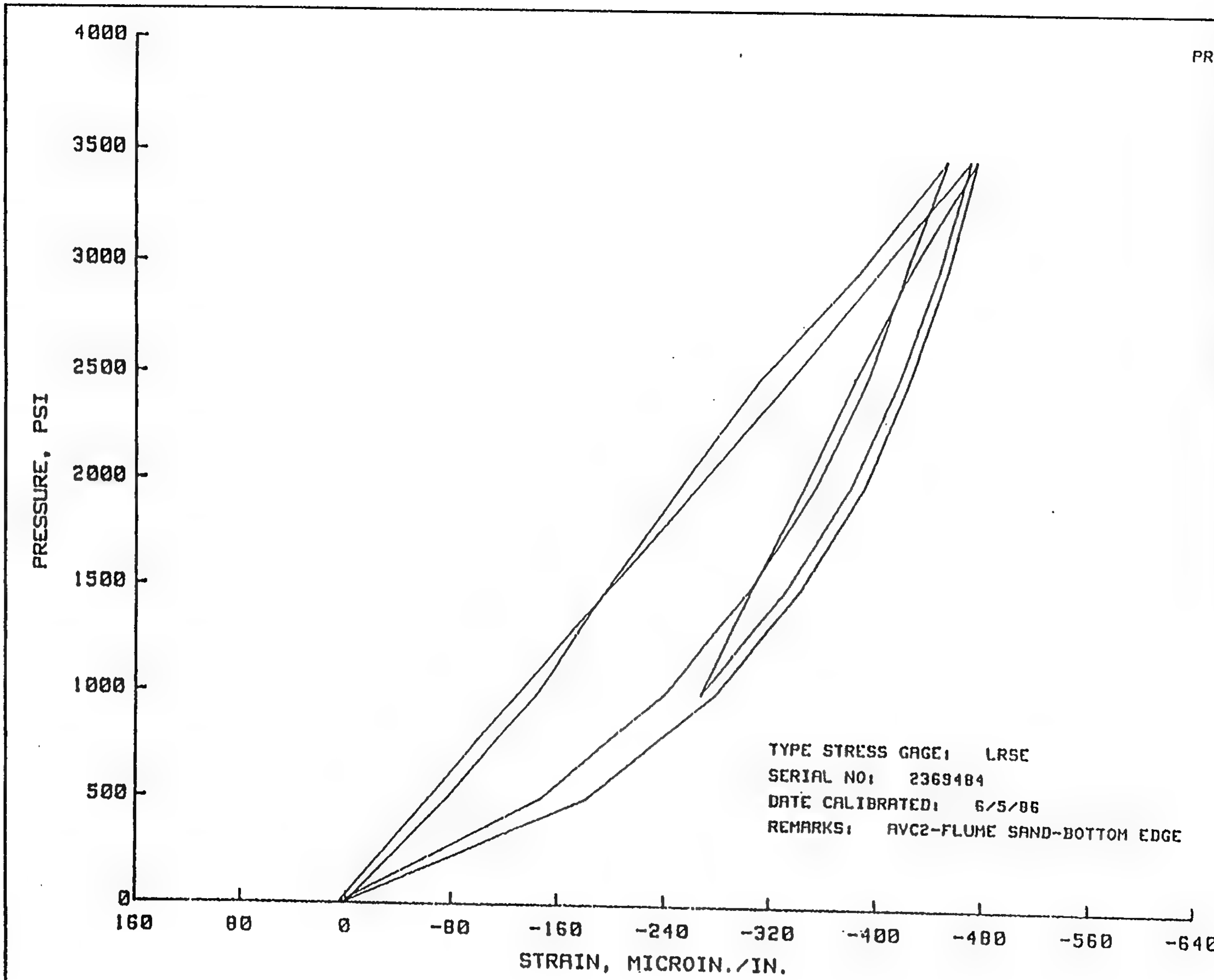
PRESSURE	STRAIN
0	0.0
500	212.6
1000	393.0
1500	543.0
2000	703.5
2500	874.3
3000	1052.2
3500	1247.8
3000	1137.0
2500	1012.2
2000	884.3
1500	724.0
1000	547.0
500	322.6
0	9.6
3500	1203.0
3000	1173.0
2500	1062.6
2000	927.0
1500	775.2
1000	597.0
1500	729.1
2000	862.2
2500	993.5
3000	1131.7
3500	1208.3
3000	1100.0
2500	1071.3
2000	940.9
1500	789.6
1000	611.7
500	376.1
0	7.0

Plate 99

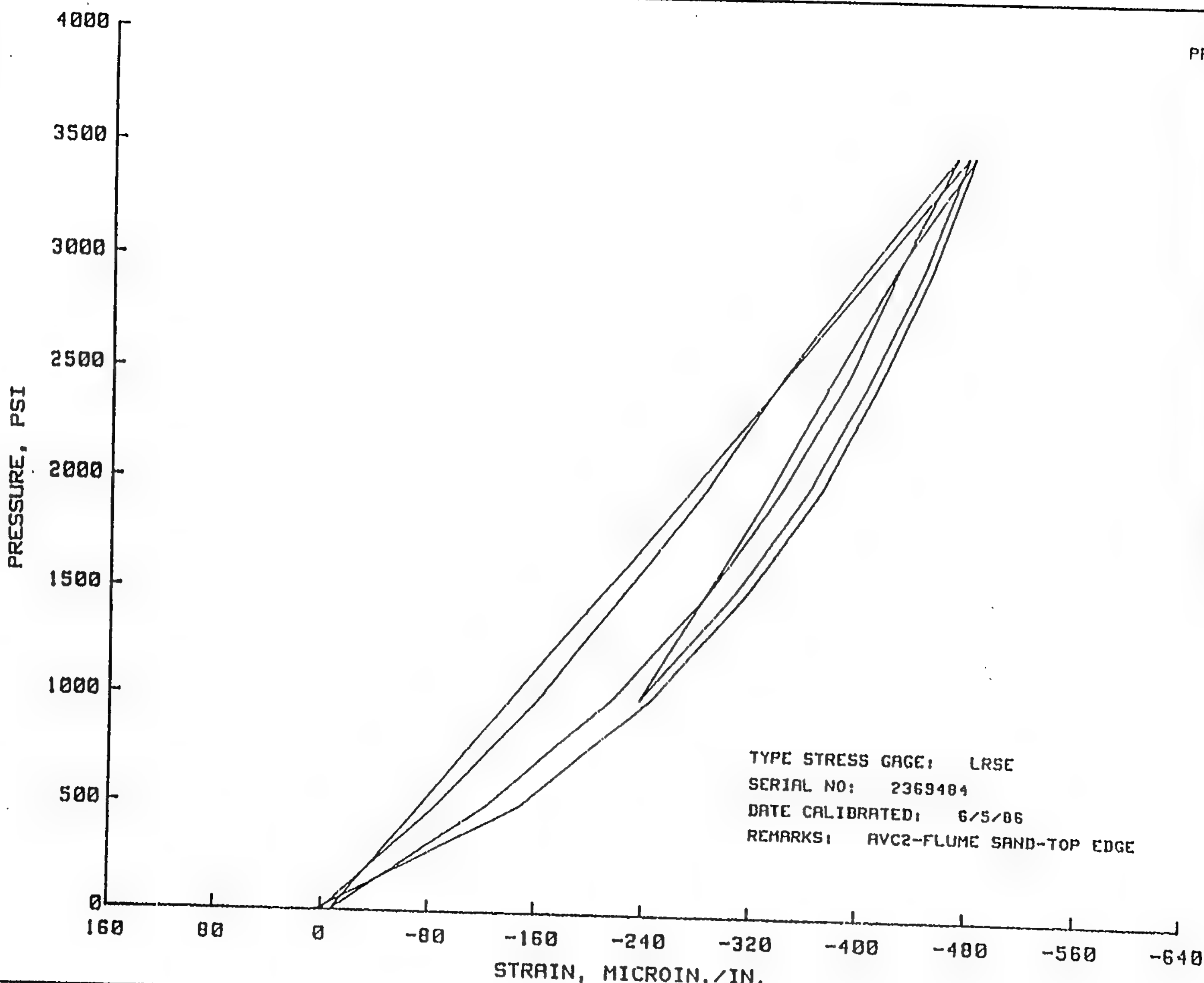


PRESSURE	STRAIN
0	0.0
500	231.7
1000	427.0
1500	596.1
2000	760.4
2500	914.0
3000	1091.3
3500	1279.6
3000	1162.6
2500	1032.6
2000	890.0
1500	720.4
1000	530.9
500	290.7
0	22.2
3500	1200.9
3000	1160.3
2500	1046.1
2000	904.3
1500	741.3
1000	556.1
1500	690.3
2000	843.0
2500	900.9
3000	1124.3
3500	1200.4
3000	1170.0
2500	1050.4
2000	913.5
1500	750.0
1000	564.0
500	326.5
0	6.1

Plate 100



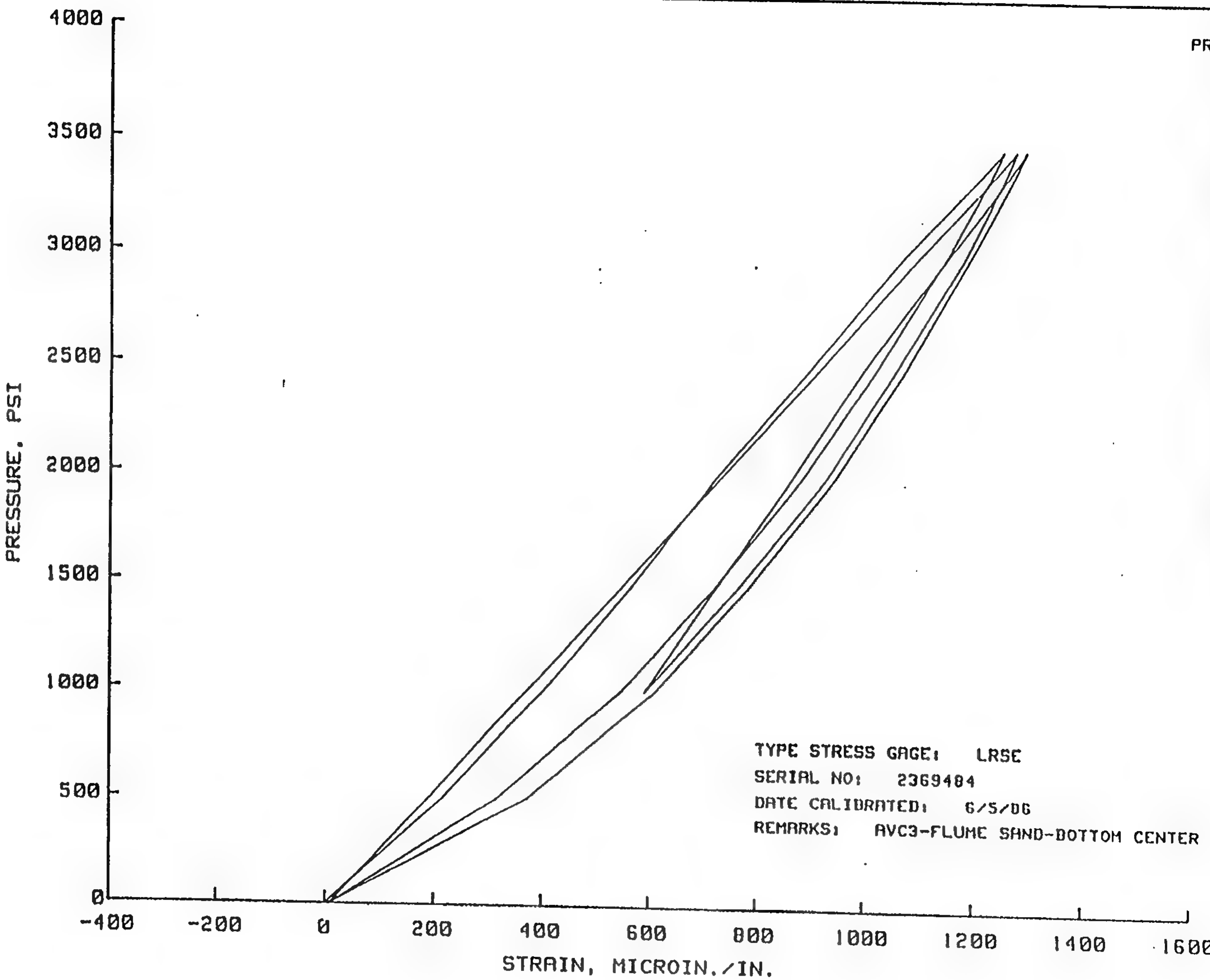
PRESSURE	STRAIN
0	0.0
500	-76.5
1000	-145.7
1500	-197.0
2000	-254.3
2500	-313.9
3000	-390.0
3500	-455.7
3000	-423.9
2500	-393.9
2000	-355.2
1500	-304.0
1000	-240.0
500	-147.0
0	5.7
3500	-473.0
3000	-440.7
2500	-410.3
2000	-381.3
1500	-331.7
1000	-267.0
1500	-306.5
2000	-347.0
2500	-384.0
3000	-427.0
3500	-477.0
3000	-455.2
2500	-426.1
2000	-391.7
1500	-342.6
1000	-270.7
500	-180.9
0	2.6



PRESSURE	STRAIN
0	0.0
500	-86.5
1000	-162.6
1500	-224.0
2000	-287.4
2500	-342.2
3000	-404.0
3500	-470.4
3000	-427.0
2500	-390.9
2000	-343.0
1500	-286.1
1000	-216.1
500	-123.5
0	-7.0
3500	-478.7
3000	-447.0
2500	-407.4
2000	-363.0
1500	-305.7
1000	-236.5
1500	-285.7
2000	-334.0
2500	-380.0
3000	-427.0
3500	-483.5
3000	-453.0
2500	-415.2
2000	-372.6
1500	-314.8
1000	-244.8
500	-148.3
0	3.9

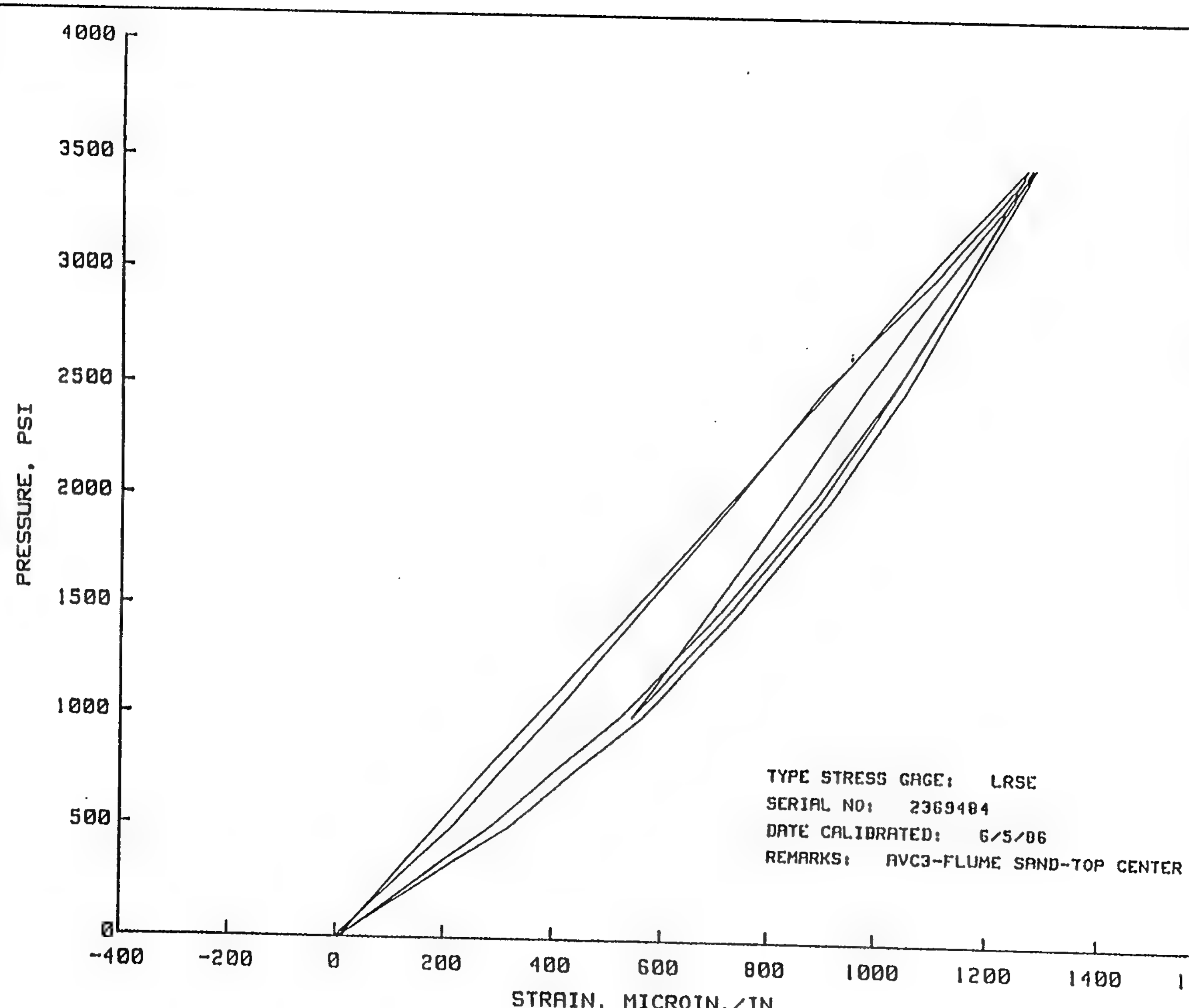
TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 6/5/86
REMARKS: AVC2-FLUME SAND-TOP EDGE

Plate 102



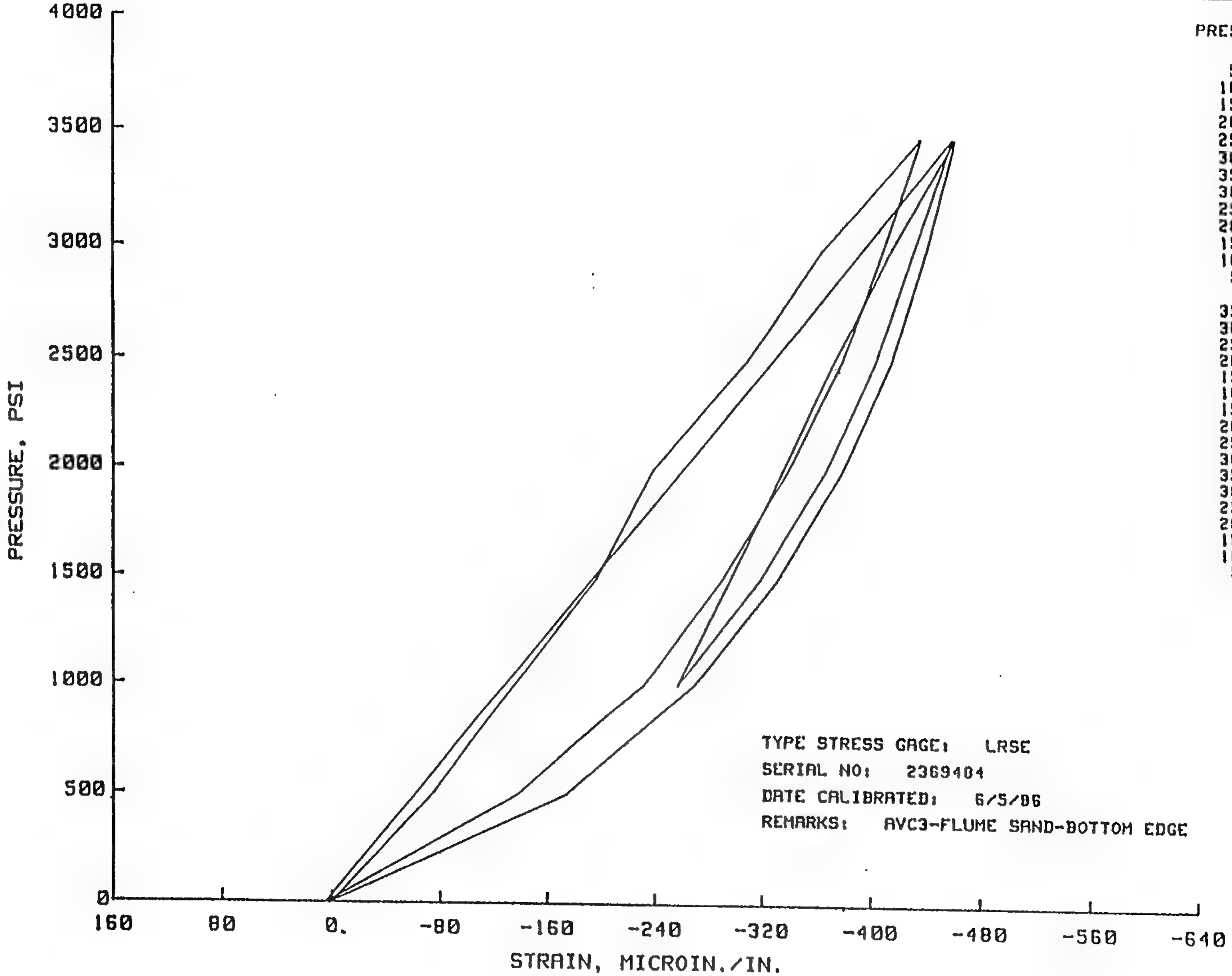
PRESSURE	STRAIN
0	0.0
500	216.1
1000	402.6
1500	570.9
2000	727.0
2500	899.6
3000	1071.3
3500	1257.8
3000	1149.6
2500	1022.6
2000	885.2
1500	726.1
1000	545.2
500	315.7
0	7.8
3500	1281.7
3000	1183.0
2500	1059.1
2000	930.4
1500	770.0
1000	590.4
1500	729.6
2000	867.4
2500	999.6
3000	1152.2
3500	1300.4
3000	1192.6
2500	1076.5
2000	946.5
1500	788.3
1000	609.1
500	370.9
0	6.1

Plate 103



PRESSURE	STRAIN
0	0.0
500	210.3
1000	397.0
1500	584.0
2000	735.7
2500	900.4
3000	1109.6
3500	1270.7
3000	1150.7
2500	1020.3
2000	879.6
1500	712.6
1000	521.7
500	207.0
0	7.4
3500	1269.6
3000	1159.6
2500	1031.7
2000	894.0
1500	729.1
1000	543.9
1500	692.6
2000	836.1
2500	975.7
3000	1120.7
3500	1204.0
3000	1170.0
2500	1051.7
2000	913.0
1500	740.7
1000	562.2
500	320.9
0	4.3

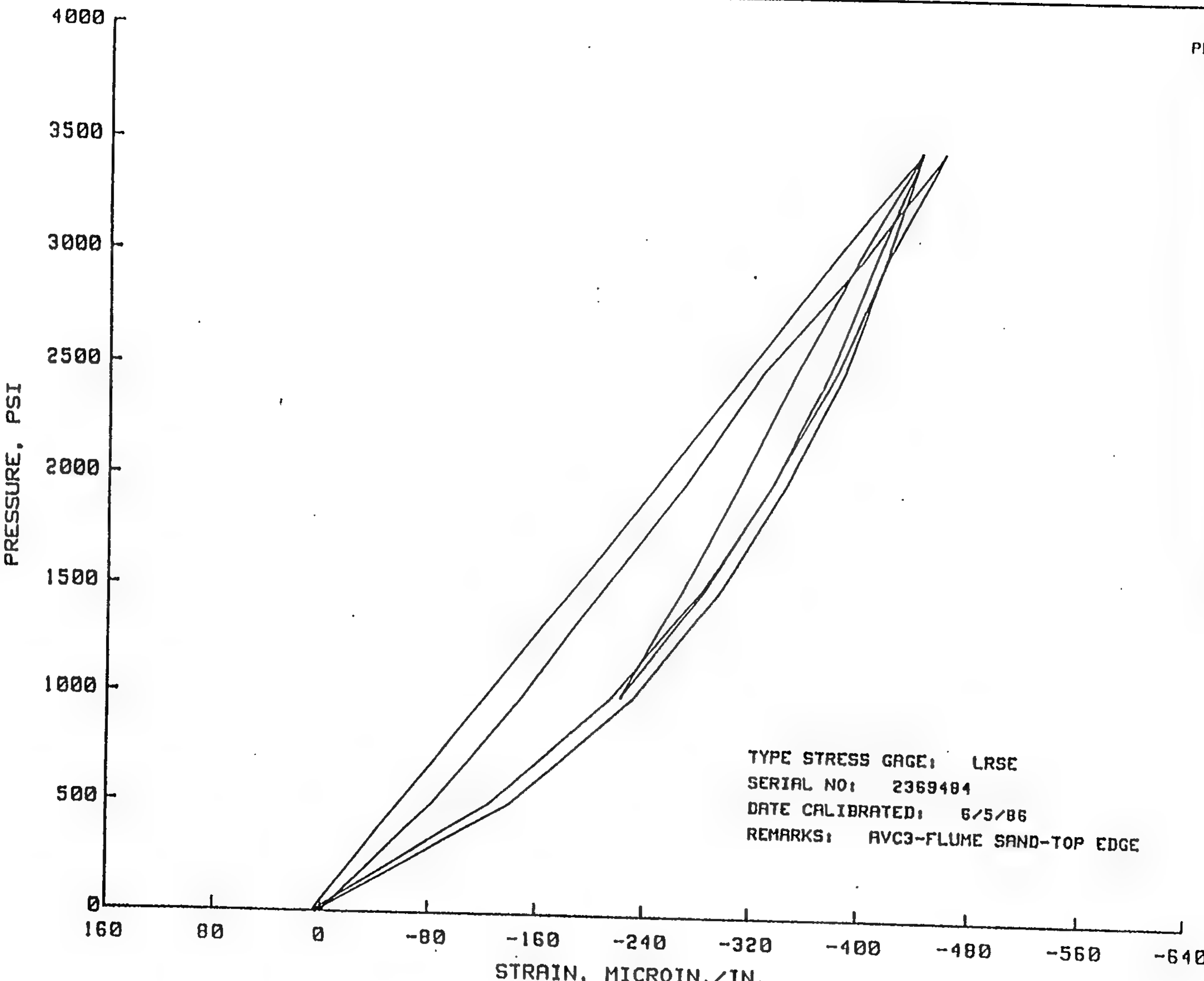
Plate 104



TYPE STRESS GAGE: LRSE
SERIAL NO: 2369404
DATE CALIBRATED: 6/5/06
REMARKS: AVC3-FLUME SAND-BOTTOM EDGE

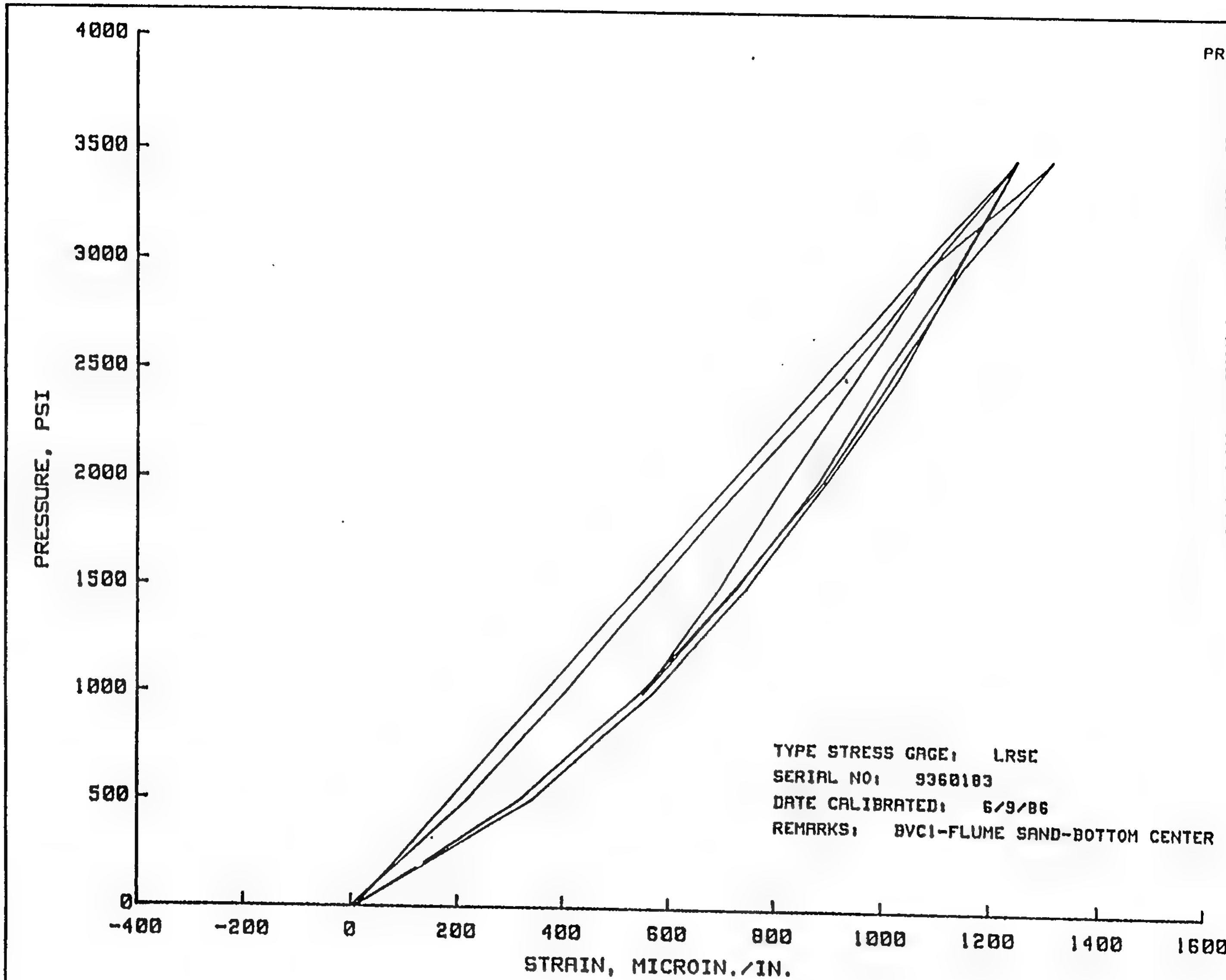
PRESSURE	STRAIN
0	0.0
500	-74.3
1000	-135.7
1500	-1,97.0
2000	-239.1
2500	-309.1
3000	-365.7
3500	-430.7
3000	-410.0
2500	-379.1
2000	-339.6
1500	-290.9
1000	-230.9
500	-137.4
0	4.0
3500	-461.3
3000	-432.6
2500	-403.9
2000	-367.4
1500	-319.1
1000	-256.5
1500	-297.4
2000	-336.1
2500	-373.9
3000	-416.1
3500	-463.5
3000	-441.7
2500	-415.7
2000	-379.6
1500	-332.2
1000	-260.7
500	-173.5
0	2.2

Plate 105



PRESSURE	STRAIN
0	0.0
500	-82.6
1000	-149.6
1500	-208.7
2000	-272.2
2500	-328.7
3000	-400.9
3500	-460.9
3000	-418.3
2500	-382.6
2000	-336.5
1500	-282.6
1000	-215.2
500	-124.3
0	6.5
3500	-444.3
3000	-410.4
2500	-377.4
2000	-336.5
1500	-284.8
1000	-221.7
1500	-268.7
2000	-312.2
2500	-353.5
3000	-397.8
3500	-444.3
3000	-417.8
2500	-388.3
2000	-347.8
1500	-296.5
1000	-231.7
500	-139.6
0	3.5

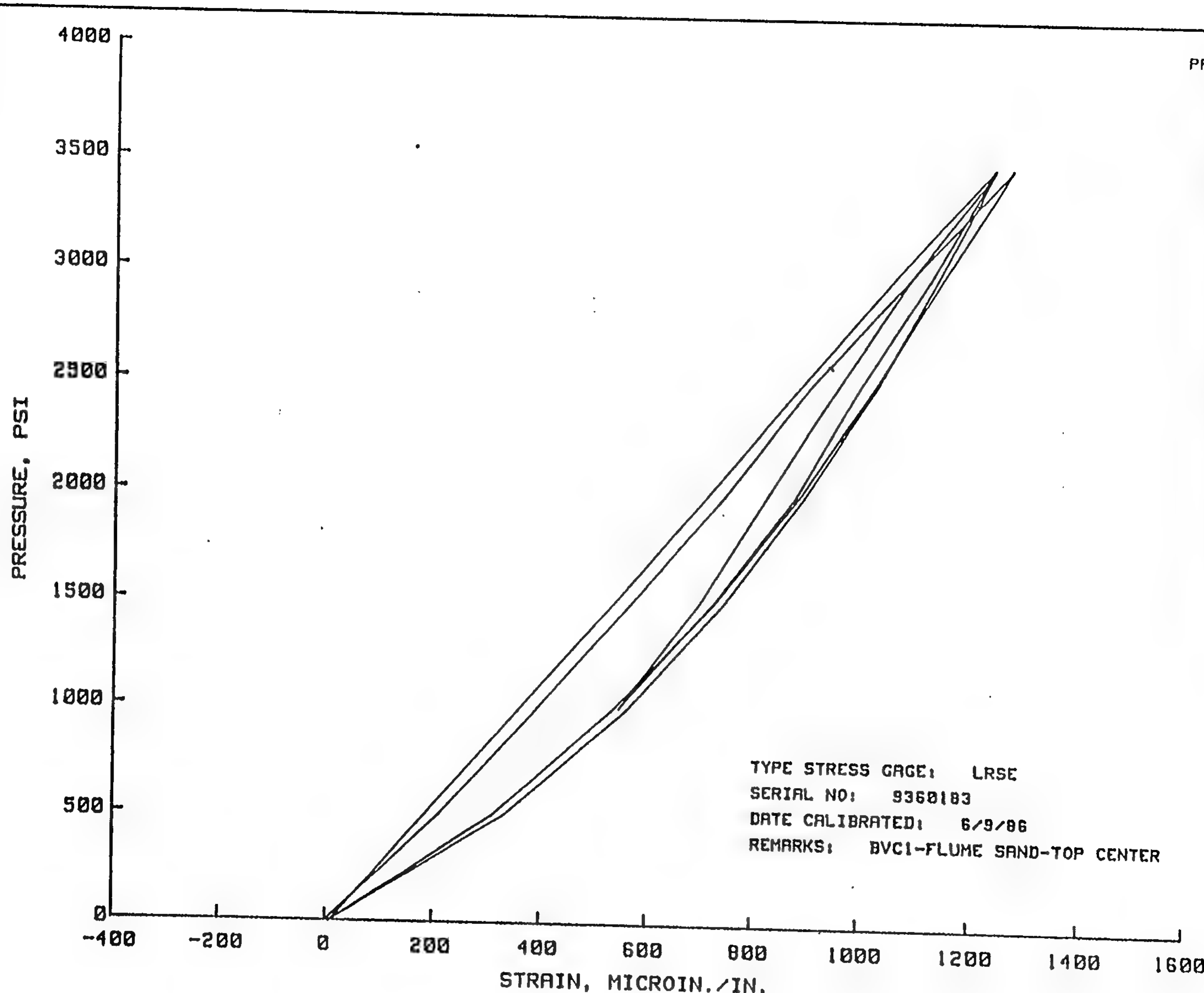
Plate 106



PRESSURE	STRAIN
0	0.0
500	219.1
1000	402.6
1500	572.6
2000	746.1
2500	930.9
3000	1093.0
3500	1320.0
3000	1152.2
2500	1022.6
2000	889.6
1500	725.2
1000	543.0
500	317.4
0	8.3
3500	1252.2
3000	1140.0
2500	1003.5
2000	881.3
1500	730.0
1000	550.4
1500	687.0
2000	823.0
2500	959.1
3000	1093.5
3500	1253.9
3000	1144.3
2500	1035.7
2000	896.5
1500	747.4
1000	567.0
500	340.9
0	5.2

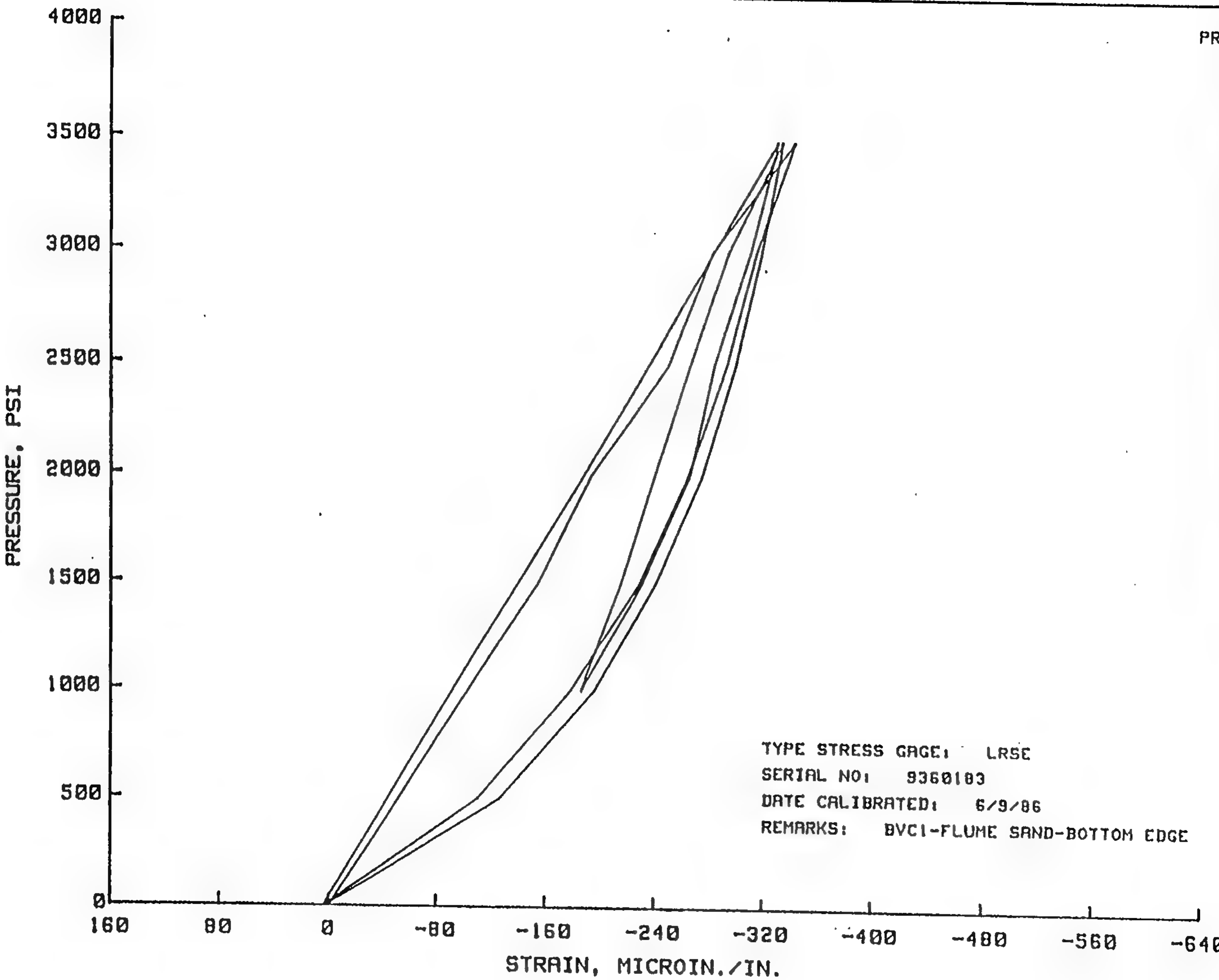
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 6/9/86
REMARKS: BVCI-FLUME SAND-BOTTOM CENTER

Plate 107



PRESSURE	STRAIN
0	0.0
500	211.3
1000	393.9
1500	570.4
2000	747.0
2500	909.1
3000	1095.7
3500	1277.4
3000	1151.7
2500	1026.5
2000	887.0
1500	725.7
1000	536.5
500	310.0
0	8.3
3500	1243.0
3000	1130.4
2500	999.6
2000	880.0
1500	723.0
1000	546.1
1500	690.7
2000	827.0
2500	960.4
3000	1095.2
3500	1246.1
3000	1142.6
2500	1030.9
2000	896.5
1500	743.5
1000	563.0
500	331.3
0	6.5

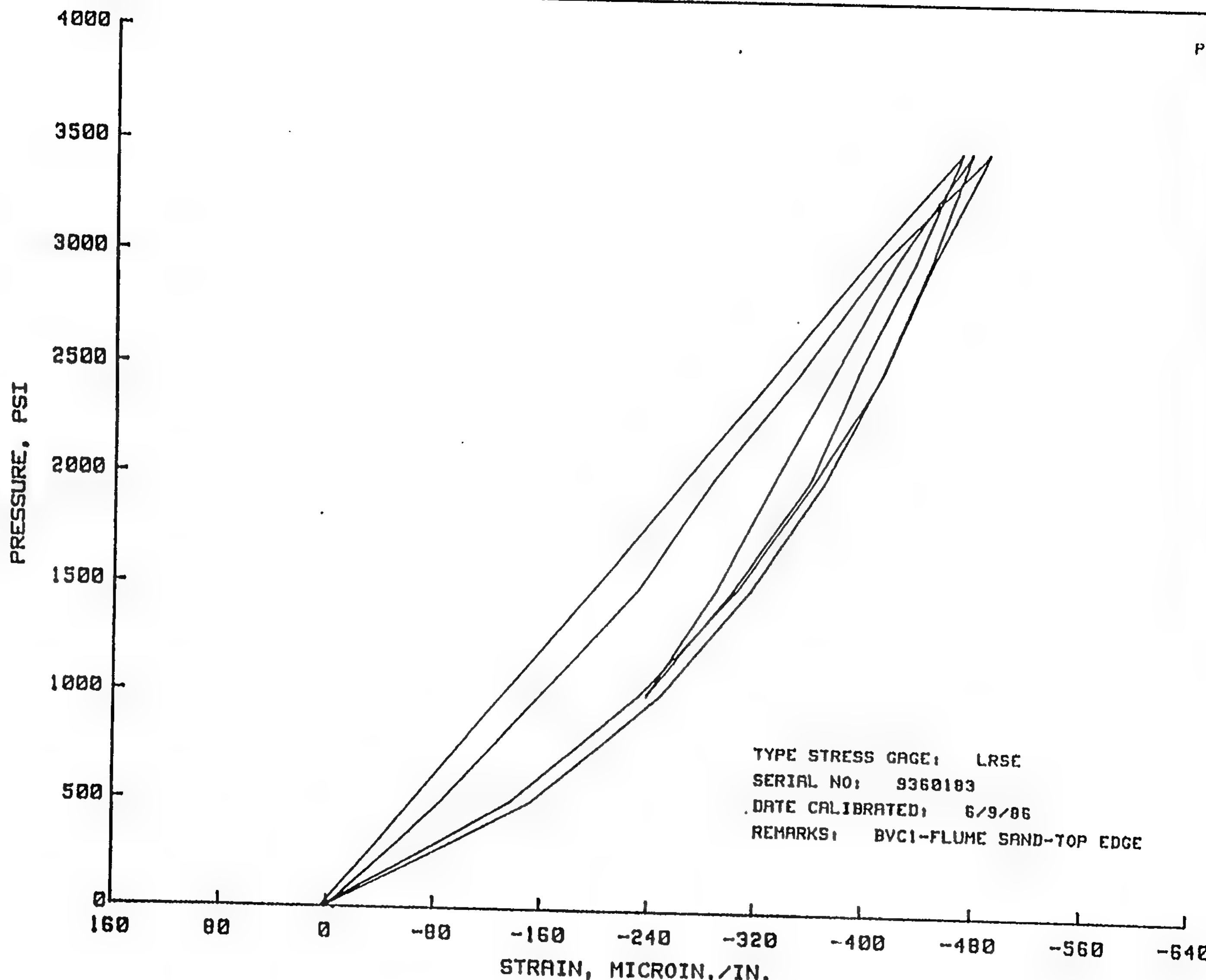
Plate 108



TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 6/9/86
REMARKS: BVC1-FLUME SAND-BOTTOM EDGE

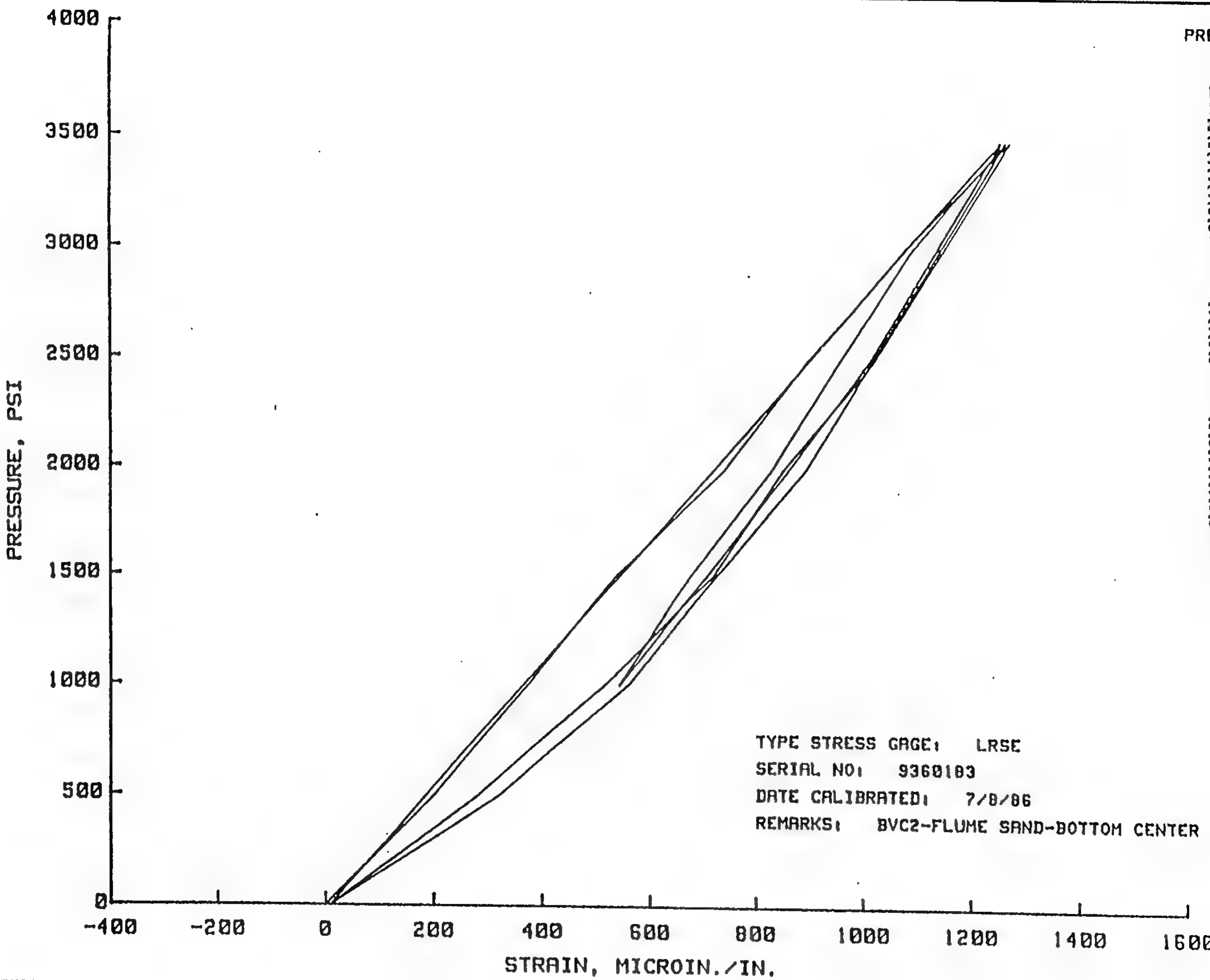
PRESSURE	STRAIN
0	0.0
500	-52.2
1000	-103.5
1500	-154.0
2000	-193.9
2500	-250.9
3000	-283.9
3500	-345.2
3000	-315.7
2500	-293.5
2000	-264.0
1500	-220.7
1000	-170.3
500	-110.4
0	4.3
3500	-332.6
3000	-311.3
2500	-284.3
2000	-266.1
1500	-230.9
1000	-106.1
1500	-215.7
2000	-240.4
2500	-267.0
3000	-295.7
3500	-336.1
3000	-319.6
2500	-300.0
2000	-275.2
1500	-240.9
1000	-195.7
500	-126.5
0	2.6

Plate 109



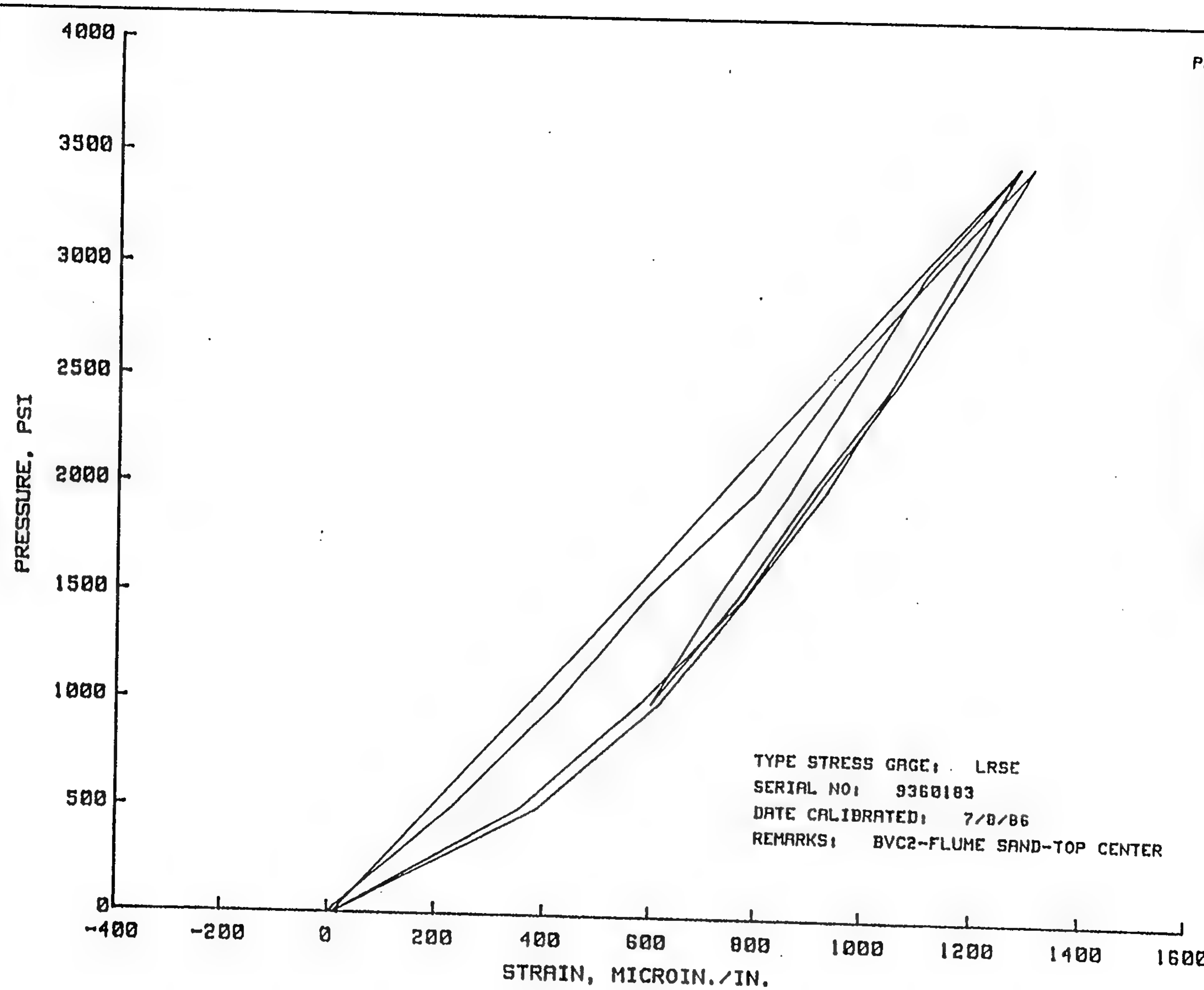
PRESSURE	STRAIN
0	0.0
500	-85.7
1000	-159.6
1500	-232.2
2000	-288.3
2500	-352.6
3000	-413.9
3500	-490.4
3000	-450.0
2500	-413.5
2000	-363.0
1500	-306.1
1000	-231.7
500	-137.0
0	4.3
3500	-470.4
3000	-437.0
2500	-394.0
2000	-360.0
1500	-303.0
1000	-237.4
1500	-290.9
2000	-333.9
2500	-377.0
3000	-423.9
3500	-477.4
3000	-448.3
2500	-412.6
2000	-370.9
1500	-316.1
1000	-247.8
500	-152.2
0	2.2

Plate 110



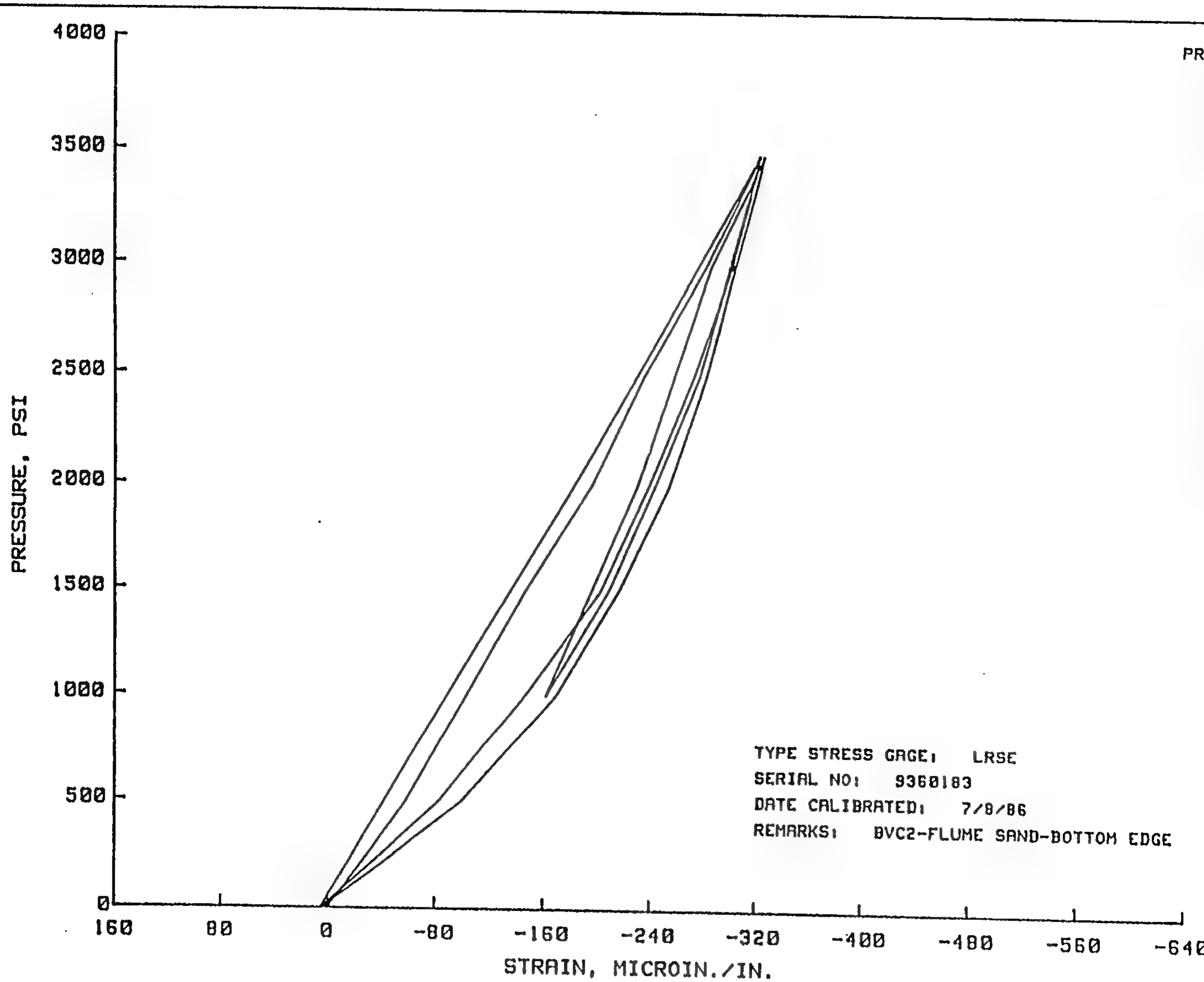
PRESSURE	STRAIN
0	0.0
500	202.2
1000	374.8
1500	537.8
2000	743.5
2500	900.0
3000	1079.1
3500	1277.8
3000	1152.2
2500	1023.5
2000	852.6
1500	719.6
1000	514.8
500	282.6
0	8.3
3500	1260.9
3000	1139.1
2500	1014.3
2000	862.6
1500	707.8
1000	541.7
1500	678.3
2000	832.2
2500	960.0
3000	1094.8
3500	1269.6
3000	1145.7
2500	1019.6
2000	894.8
1500	726.1
1000	557.8
500	321.3
0	8.3

TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/8/86
REMARKS: BVC2-FLUME SAND-BOTTOM CENTER



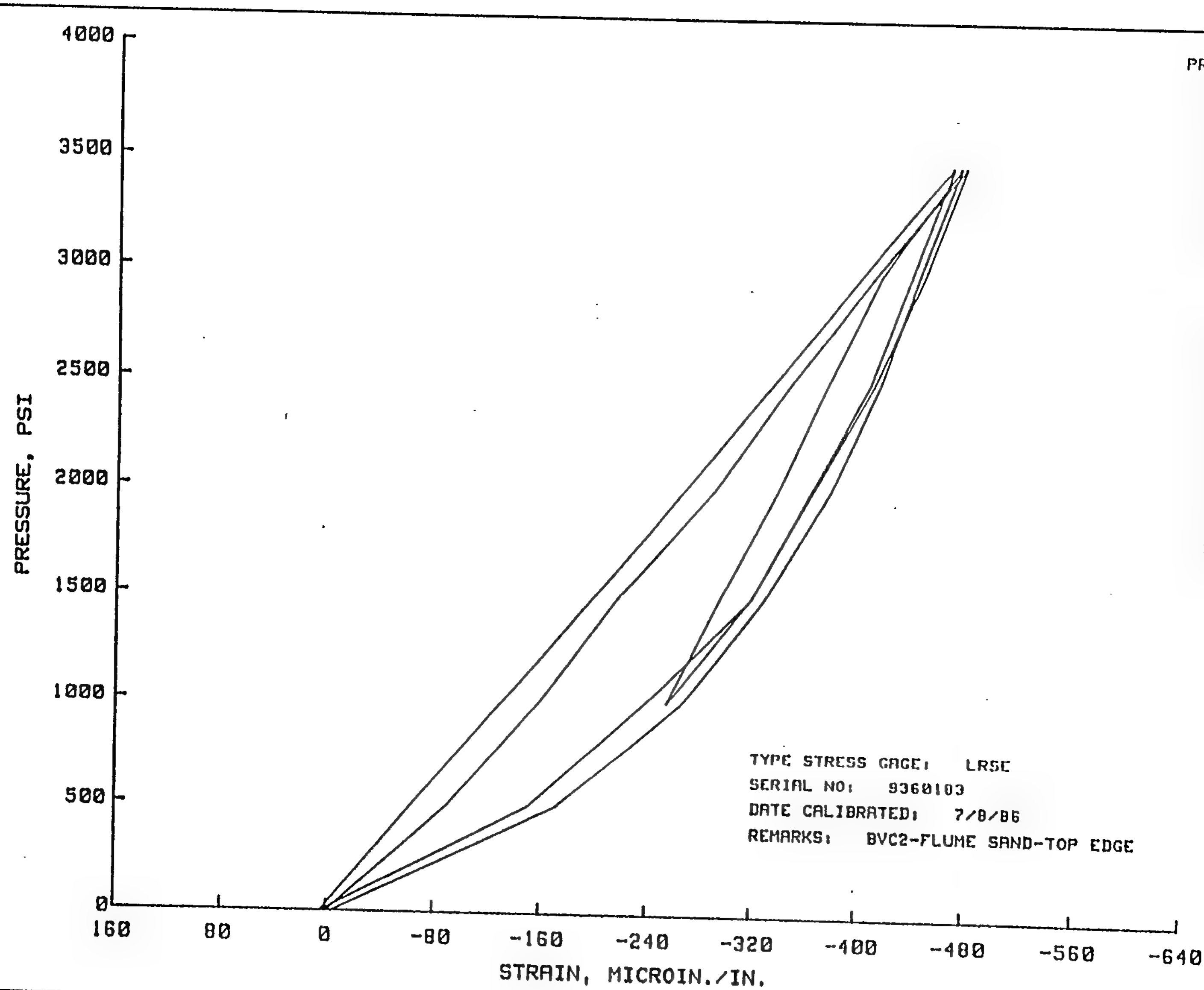
PRESSURE	STRAIN
0	0.0
500	229.6
1000	424.3
1500	592.2
2000	802.6
2500	947.0
3000	1124.0
3500	1309.6
3000	1187.0
2500	1060.0
2000	915.7
1500	775.7
1000	577.8
500	353.9
0	10.0
3500	1282.2
3000	1167.4
2500	1051.7
2000	904.0
1500	763.9
1000	599.6
1500	725.2
2000	868.1
2500	907.0
3000	1113.5
3500	1285.7
3000	1165.7
2500	1051.7
2000	932.2
1500	778.3
1000	614.0
500	385.7
0	10.0

Plate 112



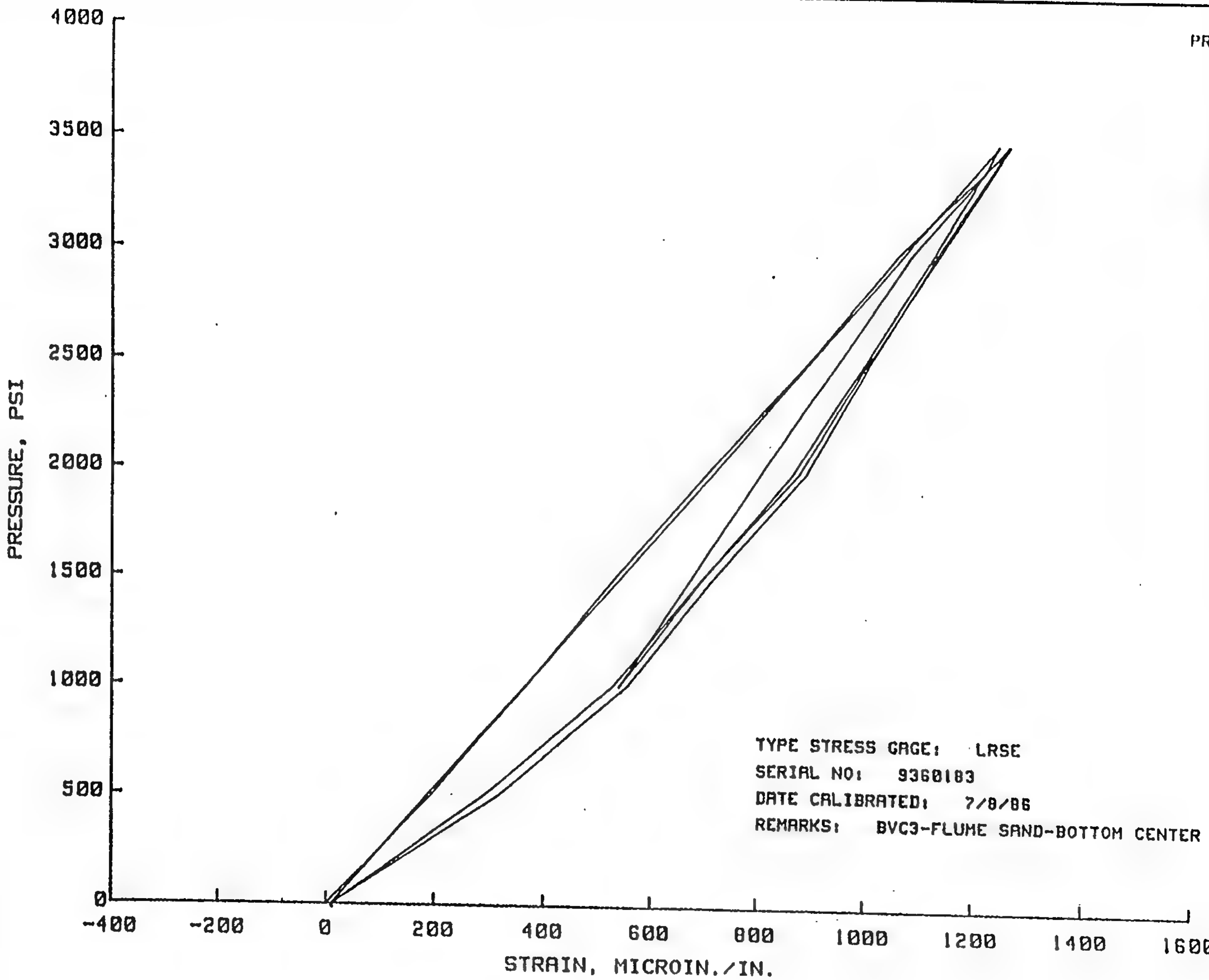
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/8/86
REMARKS: BVC2-FLUME SAND-BOTTOM EDGE

PRESSURE	STRAIN
0	0.0
500	-58.3
1000	-103.5
1500	-147.4
2000	-196.5
2500	-236.1
3000	-283.9
3500	-325.2
3000	-303.5
2500	-273.9
2000	-239.1
1500	-203.0
1000	-146.1
500	-82.6
0	5.7
3500	-325.2
3000	-301.7
2500	-278.3
2000	-243.9
1500	-209.1
1000	-161.7
1500	-196.5
2000	-230.9
2500	-259.6
3000	-287.8
3500	-328.7
3000	-305.7
2500	-283.5
2000	-254.8
1500	-216.5
1000	-169.1
500	-99.6
0	4.8



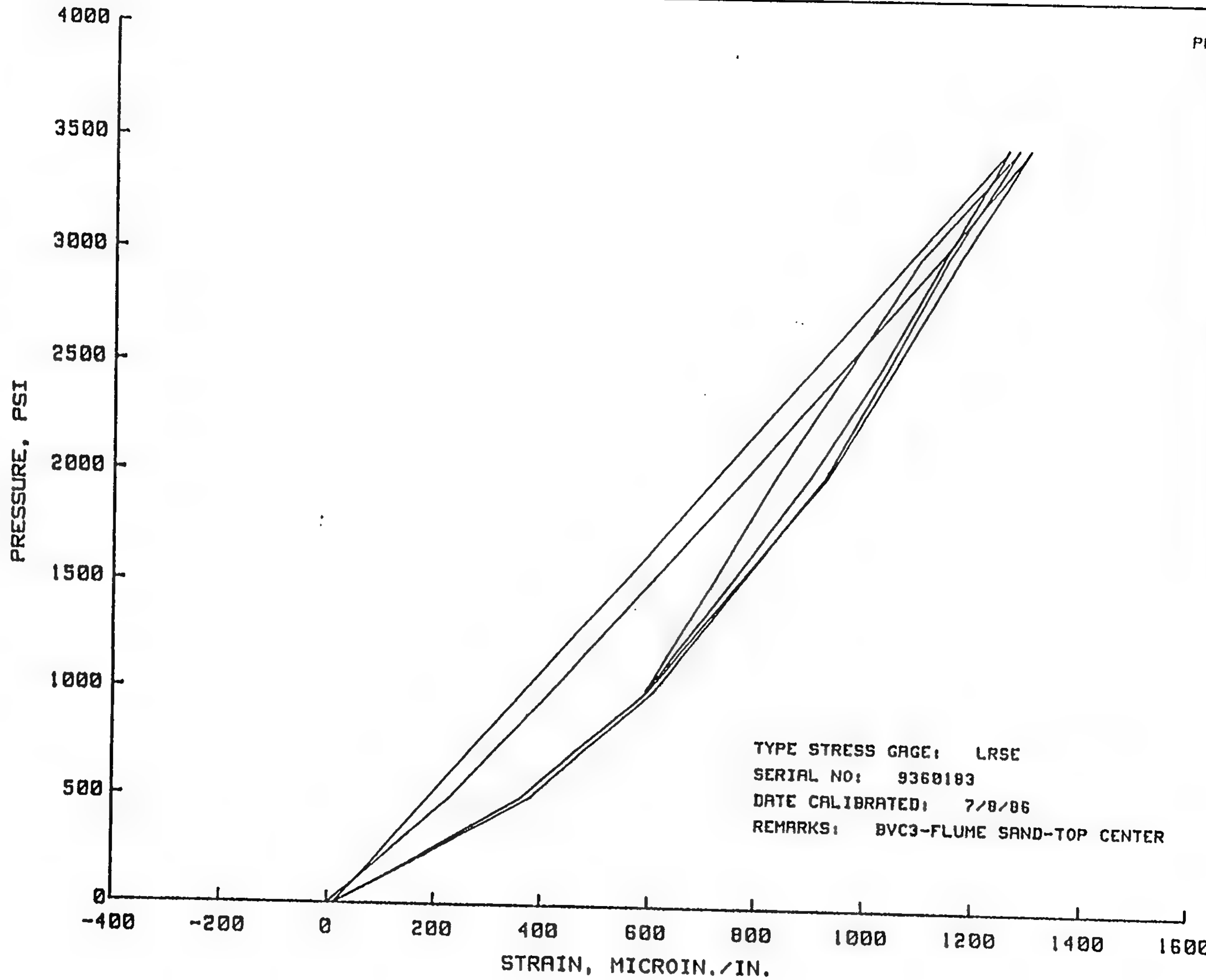
PRESSURE	STRAIN
0	0.0
500	-90.4
1000	-159.1
1500	-217.4
2000	-290.0
2500	-340.3
3000	-413.0
3500	-480.4
3000	-449.6
2500	-411.3
2000	-364.8
1500	-318.7
1000	-237.8
500	-150.9
0	4.8
3500	-470.9
3000	-440.0
2500	-408.3
2000	-363.5
1500	-318.3
1000	-254.3
1500	-295.2
2000	-338.7
2500	-376.5
3000	-417.8
3500	-476.5
3000	-445.7
2500	-416.1
2000	-378.3
1500	-328.7
1000	-266.1
500	-171.7
0	-3.5

Plate 114



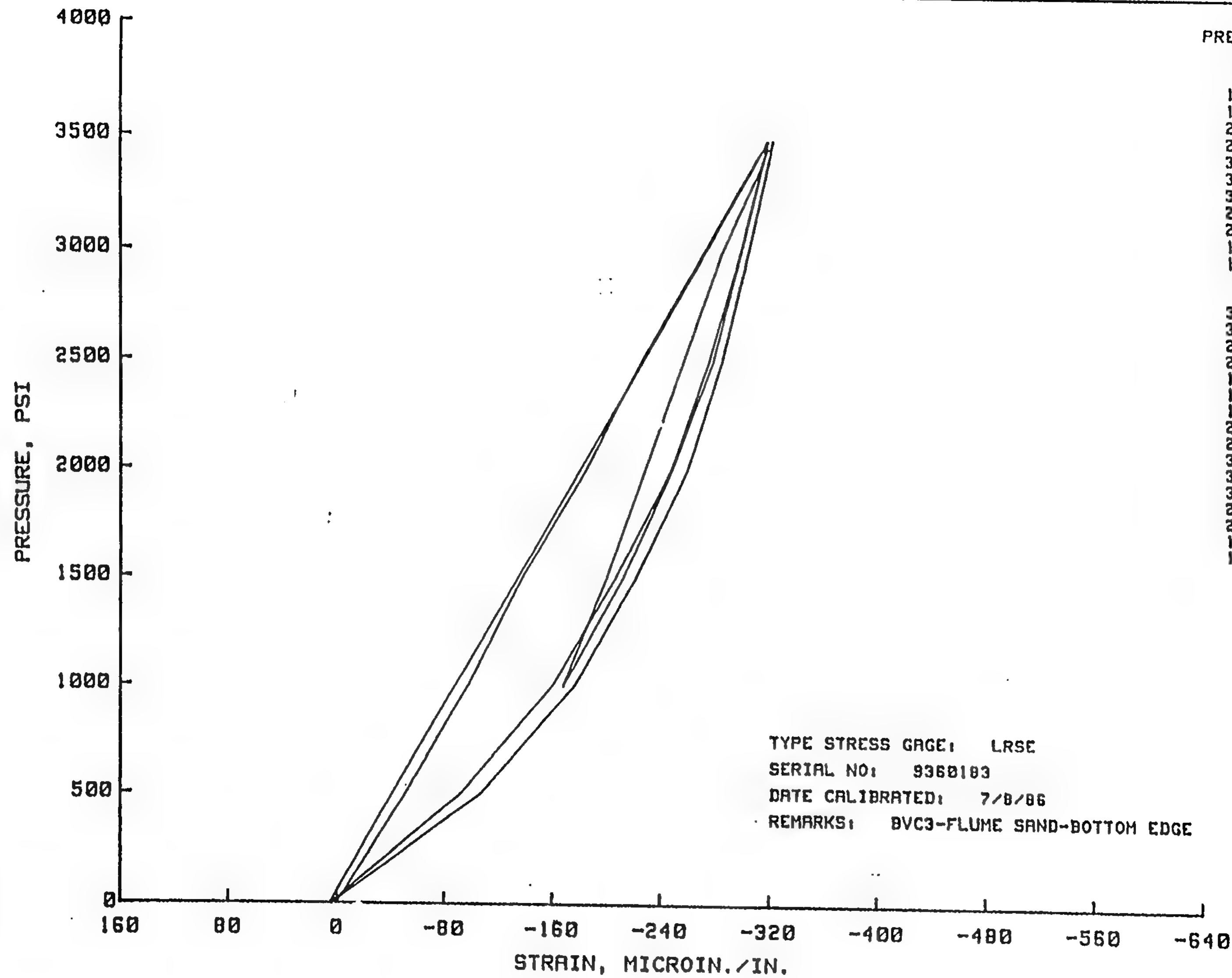
PRESSURE	STRAIN
0	0.0
500	194.0
1000	366.5
1500	532.2
2000	700.7
2500	894.8
3000	1066.5
3500	1276.1
3000	1142.6
2500	1005.7
2000	880.9
1500	695.7
1000	526.1
500	290.0
0	9.1
3500	1254.3
3000	1131.3
2500	1000.4
2000	869.1
1500	697.8
1000	530.7
1500	676.5
2000	809.6
2500	951.7
3000	1091.3
3500	1271.7
3000	1137.0
2500	1011.3
2000	894.3
1500	716.5
1000	552.6
500	316.1
0	8.3

TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/8/86
REMARKS: BVC3-FLUME SAND-BOTTOM CENTER

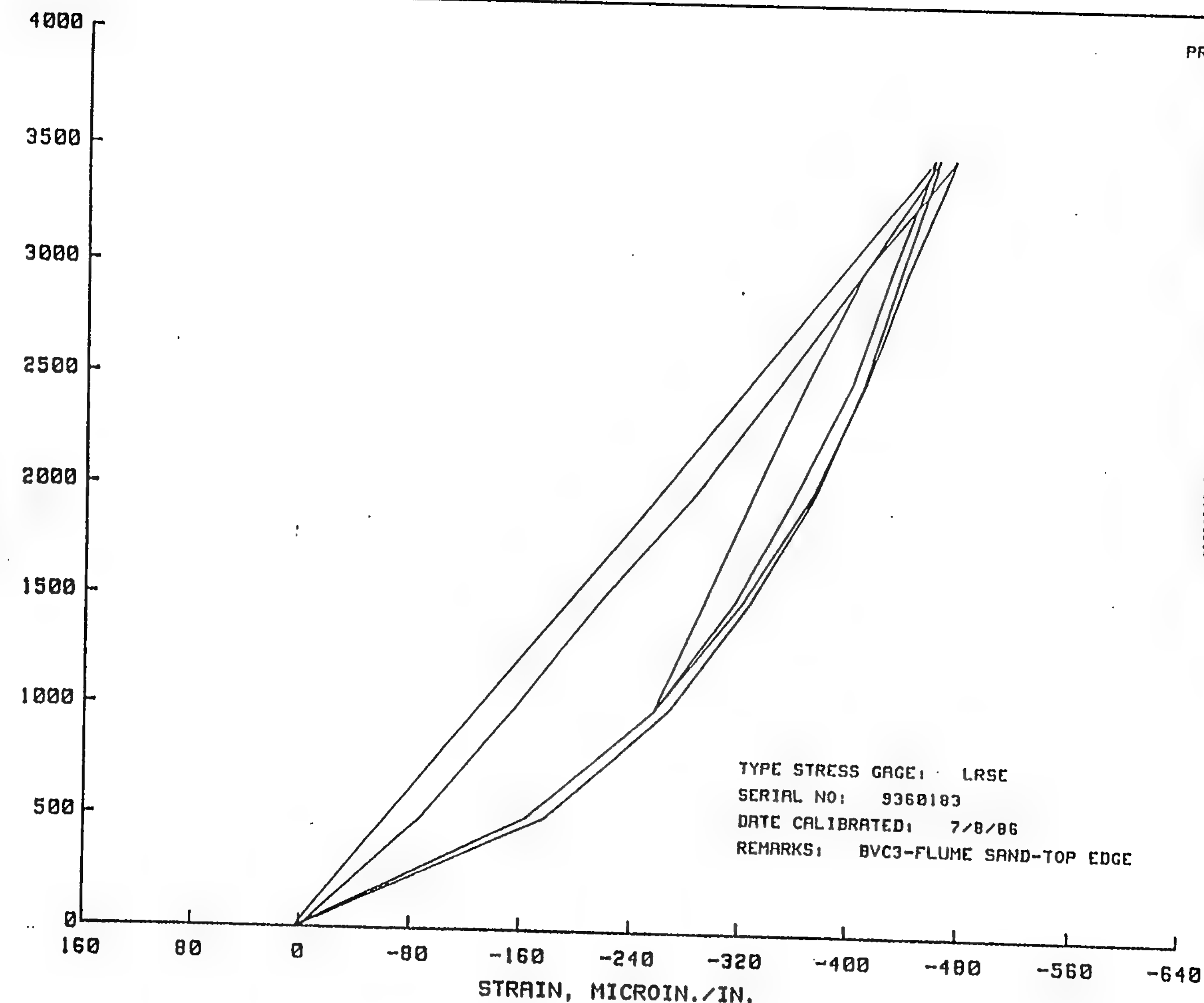


PRESSURE	STRAIN
0	0.0
500	230.9
1000	421.3
1500	590.3
2000	783.5
2500	959.6
3000	1130.3
3500	1305.2
3000	1173.0
2500	1052.6
2000	931.7
1500	762.6
1000	596.1
500	363.0
0	11.3
3500	1263.9
3000	1143.9
2500	1020.7
2000	900.0
1500	740.3
1000	592.2
1500	716.1
2000	830.3
2500	970.4
3000	1103.0
3500	1203.0
3000	1151.7
2500	1040.9
2000	927.0
1500	767.4
1000	607.4
500	379.6
0	10.9

Plate 116

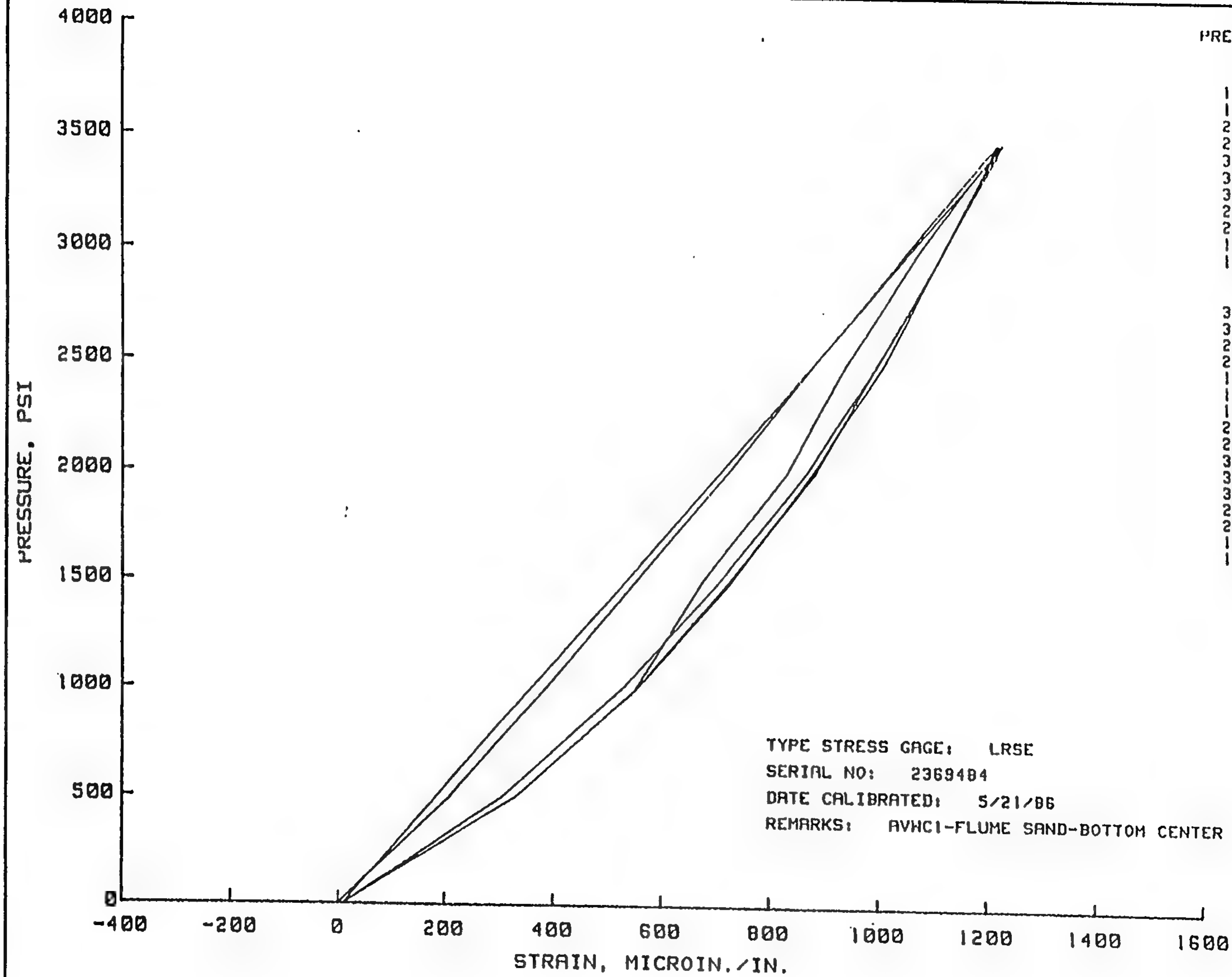


PRESSURE	STRAIN
0	0.0
500	-51.3
1000	-97.4
1500	-137.4
2000	-185.2
2500	-226.1
3000	-272.2
3500	-319.6
3000	-299.1
2500	-275.7
2000	-247.4
1500	-206.5
1000	-159.6
500	-91.7
0	5.2
3500	-320.4
3000	-299.6
2500	-278.7
2000	-248.3
1500	-212.2
1000	-167.8
1500	-200.4
2000	-228.7
2500	-257.4
3000	-286.1
3500	-323.9
3000	-304.8
2500	-285.2
2000	-259.6
1500	-221.3
1000	-176.1
500	-106.5
0	3.9

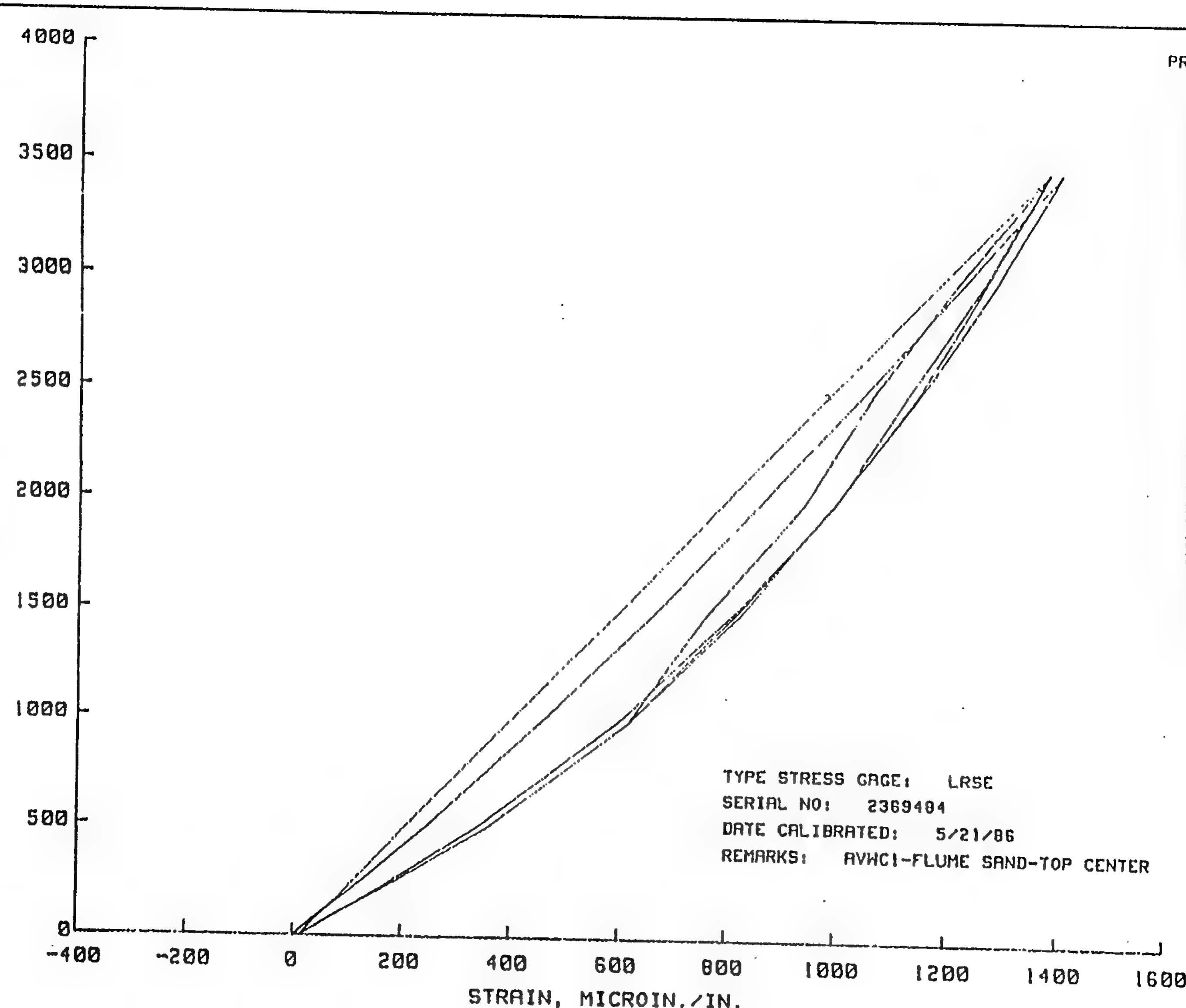


PRESSURE	STRAIN
0	0.0
500	-87.8
1000	-155.7
1500	-217.4
2000	-207.0
2500	-350.0
3000	-409.6
3500	-476.1
3000	-441.7
2500	-411.7
2000	-373.5
1500	-321.7
1000	-257.0
500	-163.5
0	3.9
3500	-460.9
3000	-430.0
2500	-401.7
2000	-360.9
1500	-316.1
1000	-256.5
1500	-293.9
2000	-330.4
2500	-360.7
3000	-410.0
3500	-464.3
3000	-437.0
2500	-410.4
2000	-375.7
1500	-327.4
1000	-267.4
500	-177.0
0	3.0

Plate 118

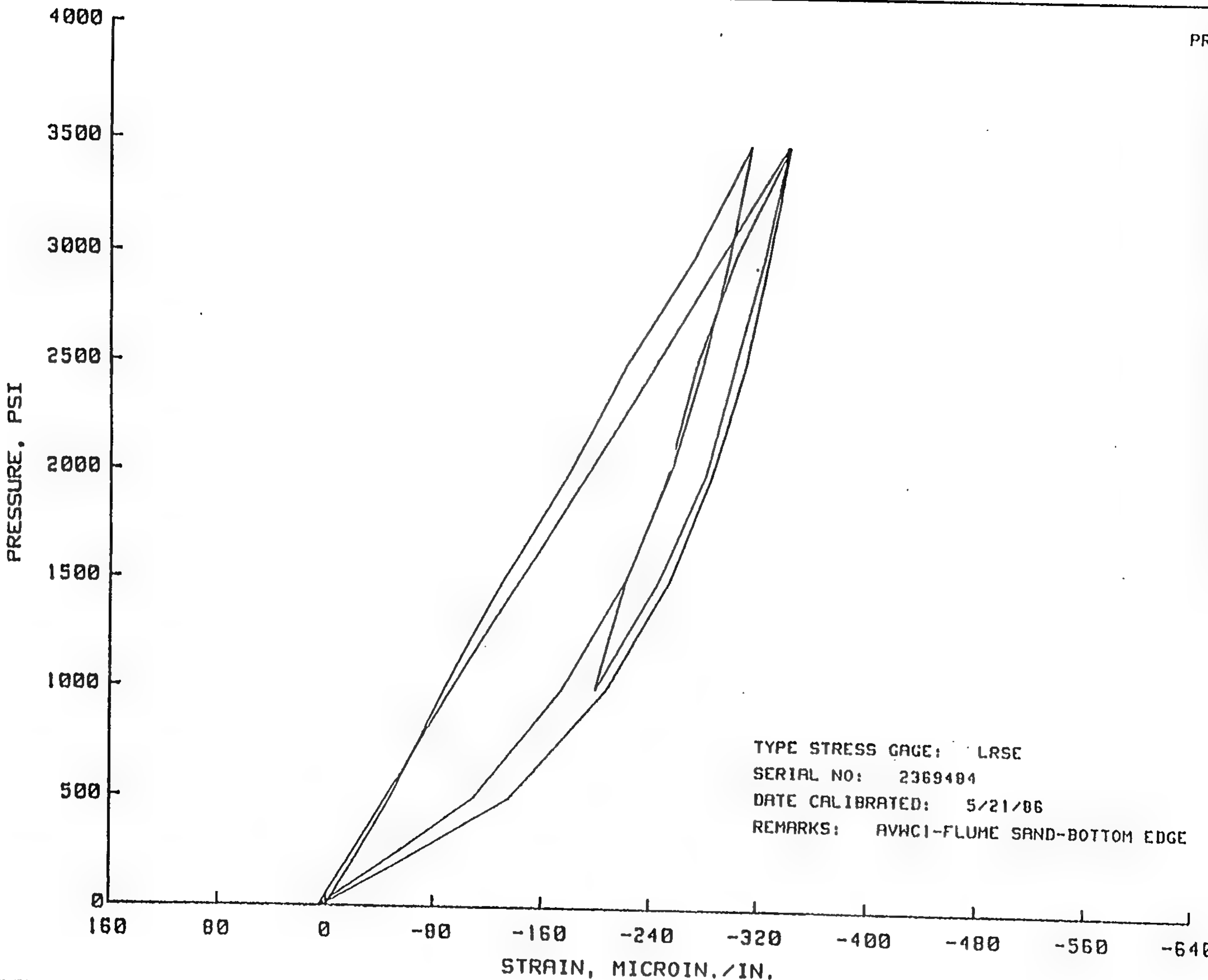


PRESSURE	STRAIN
0	0.0
500	209.6
1000	386.5
1500	551.7
2000	723.0
2500	883.9
3000	1051.3
3500	1221.3
3000	1117.8
2500	998.3
2000	865.7
1500	705.7
1000	525.2
500	305.7
0	9.1
3500	1231.7
3000	1117.8
2500	997.8
2000	882.6
1500	723.5
1000	550.9
1500	675.7
2000	831.3
2500	942.6
3000	1073.9
3500	1225.7
3000	1117.4
2500	1010.0
2000	877.0
1500	728.7
1000	552.6
500	329.6
0	8.3



PRESSURE	STRAIN
0	0.0
500	247.0
1000	462.2
1500	667.0
2000	863.0
2500	1049.6
3000	1227.0
3500	1405.7
3000	1285.2
2500	1150.0
2000	997.0
1500	812.6
1000	600.9
500	340.0
0	11.7
3500	1381.7
3000	1262.2
2500	1128.3
2000	998.7
1500	818.3
1000	619.1
1500	765.7
2000	944.3
2500	1067.4
3000	1216.5
3500	1383.5
3000	1267.0
2500	1146.1
2000	997.0
1500	827.0
1000	622.6
500	359.1
0	10.9

Plate 120

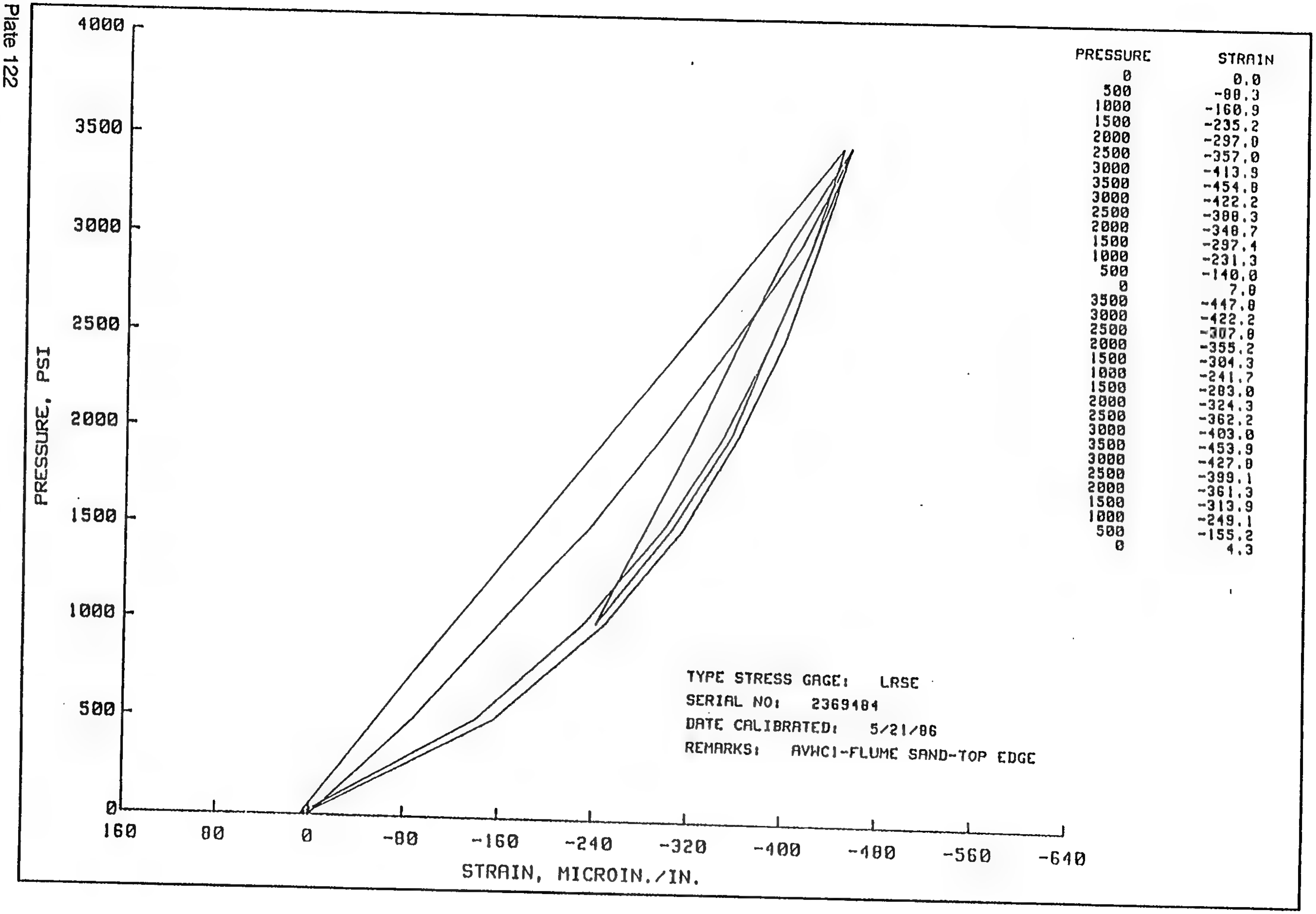


PRESSURE	STRAIN
0	0.0
500	-47.8
1000	-80.7
1500	-131.7
2000	-179.6
2500	-221.7
3000	-273.5
3500	-315.7
3000	-298.7
2500	-278.7
2000	-254.3
1500	-220.4
1000	-174.3
500	-109.1
0	5.7
3500	-343.0
3000	-324.8
2500	-302.6
2000	-281.3
1500	-245.7
1000	-198.7
1500	-221.7
2000	-253.0
2500	-274.3
3000	-303.9
3500	-344.3
3000	-327.0
2500	-310.4
2000	-286.1
1500	-253.9
1000	-207.0
500	-135.2
0	3.5

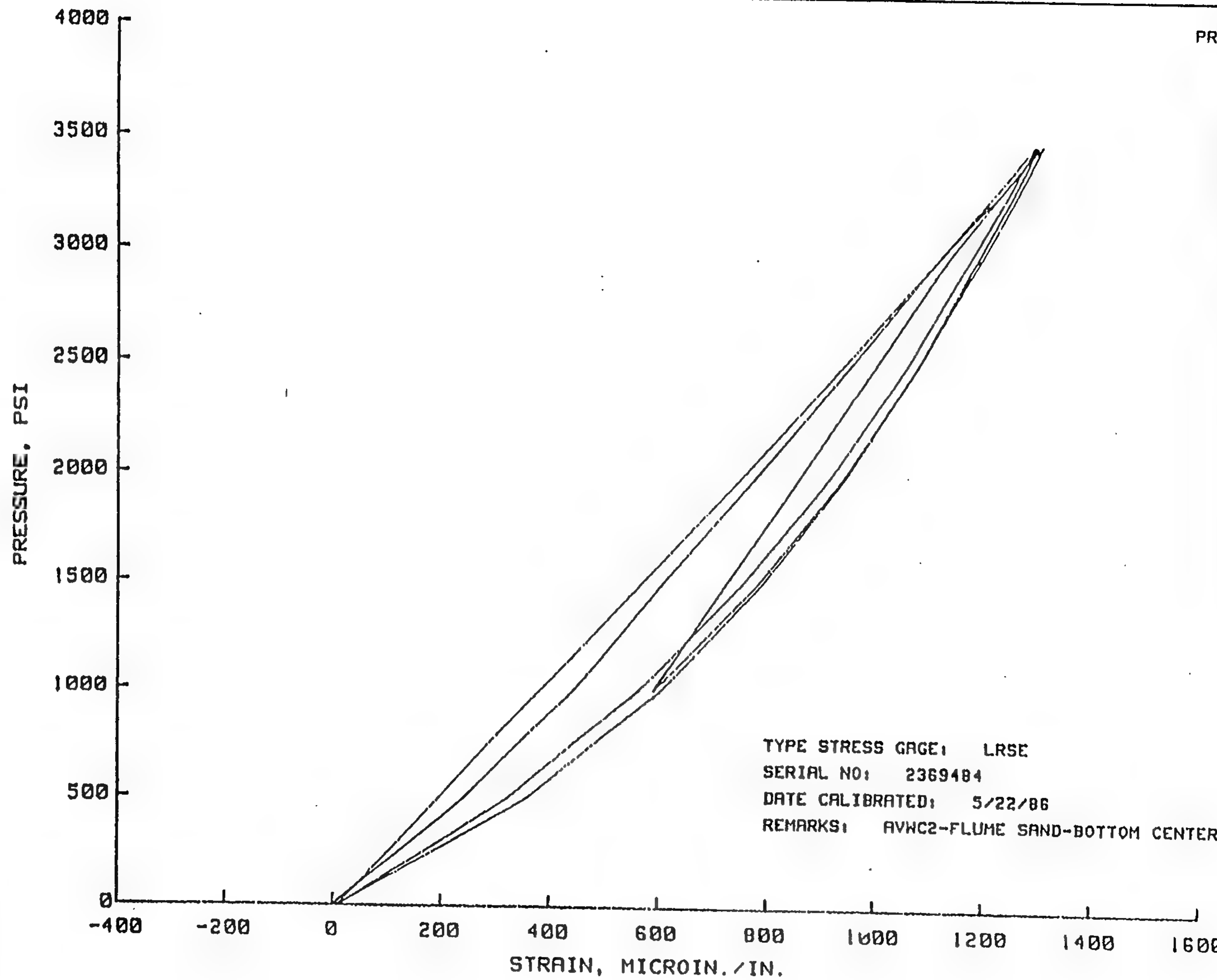
TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 5/21/86
REMARKS: AVWCI-FLUME SAND-BOTTOM EDGE

Plate 121

Plate 122

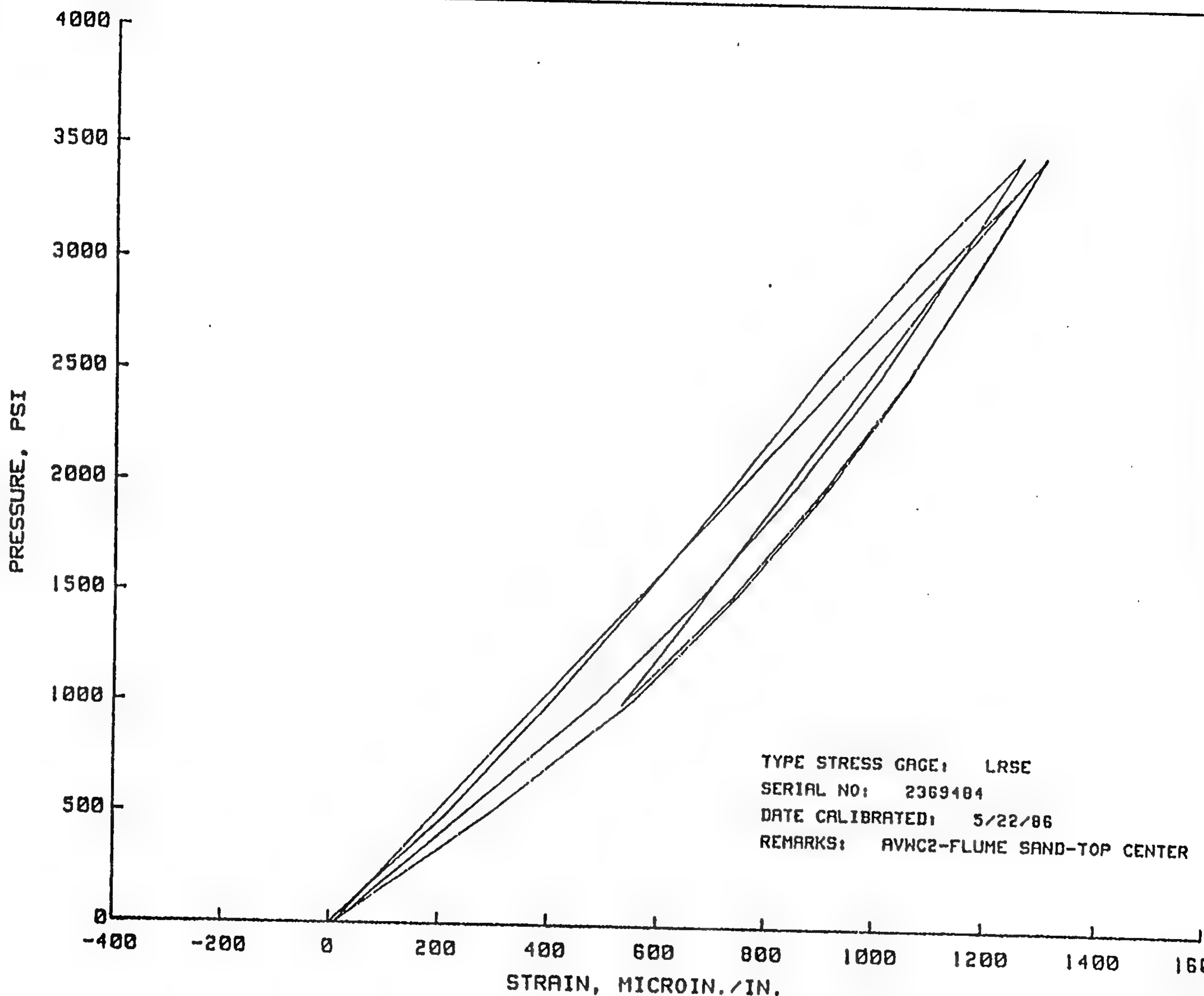


PRESSURE	STRAIN
0	0.0
500	-80.3
1000	-160.9
1500	-235.2
2000	-297.0
2500	-357.0
3000	-413.9
3500	-454.0
3000	-422.2
2500	-388.3
2000	-348.7
1500	-297.4
1000	-231.3
500	-140.0
0	7.0
3500	-447.0
3000	-422.2
2500	-387.0
2000	-355.2
1500	-304.3
1000	-241.7
1500	-283.0
2000	-324.3
2500	-362.2
3000	-403.0
3500	-453.9
3000	-427.0
2500	-399.1
2000	-361.3
1500	-313.9
1000	-249.1
500	-155.2
0	4.3



PRESSURE	STRAIN
0	0.0
500	243.5
1000	444.3
1500	609.1
2000	782.2
2500	957.4
3000	1130.4
3500	1302.2
3000	1184.8
2500	1061.7
2000	918.3
1500	754.3
1000	561.7
500	322.2
0	9.1
3500	1317.0
3000	1204.0
2500	1082.2
2000	943.0
1500	782.6
1000	589.6
1500	726.1
2000	863.0
2500	1004.3
3000	1147.0
3500	1308.7
3000	1197.8
2500	1082.6
2000	947.0
1500	790.4
1000	602.6
500	357.0
0	8.3

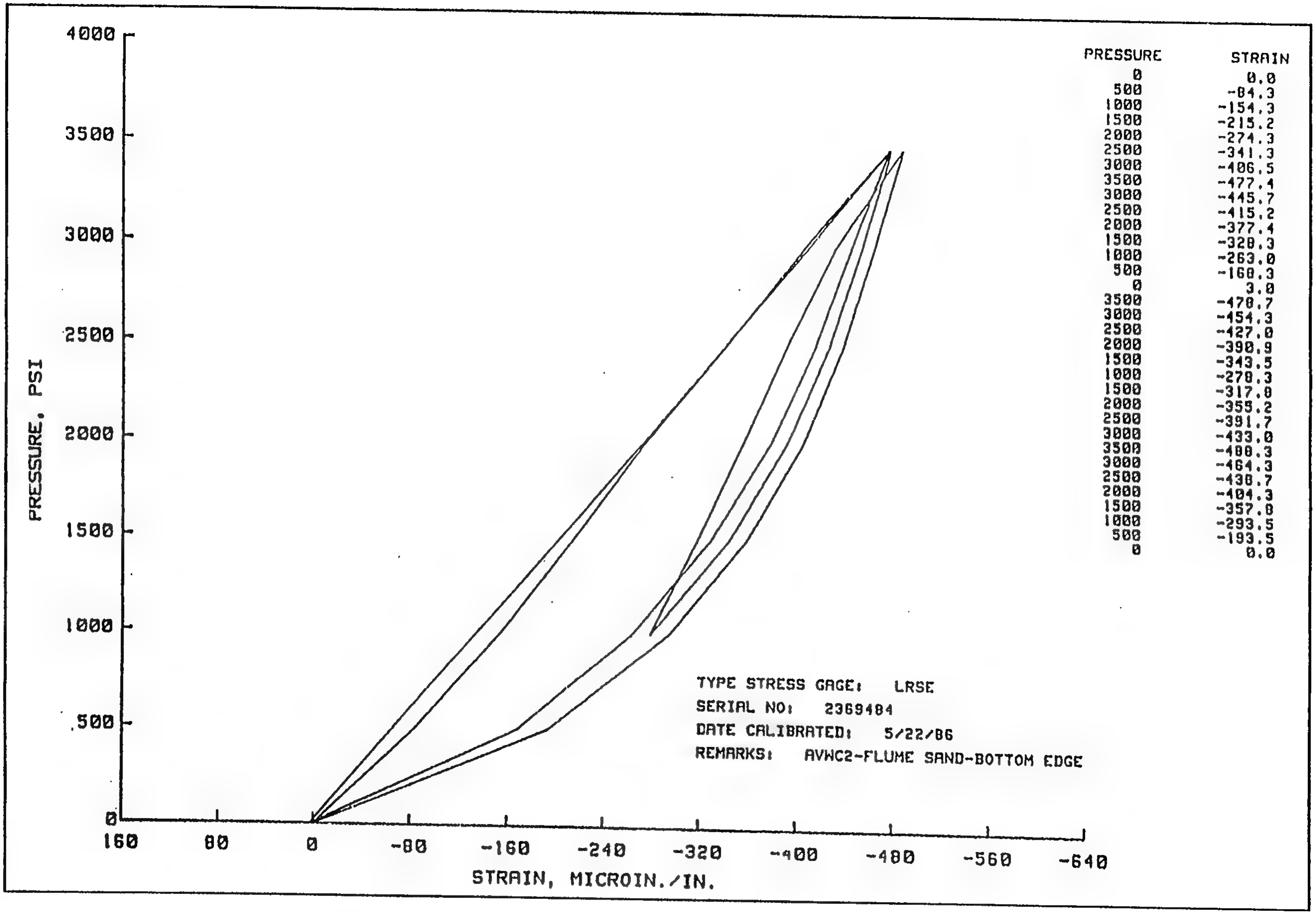
Plate 123



TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 5/22/86
REMARKS: AVWC2-FLUME SAND-TOP CENTER

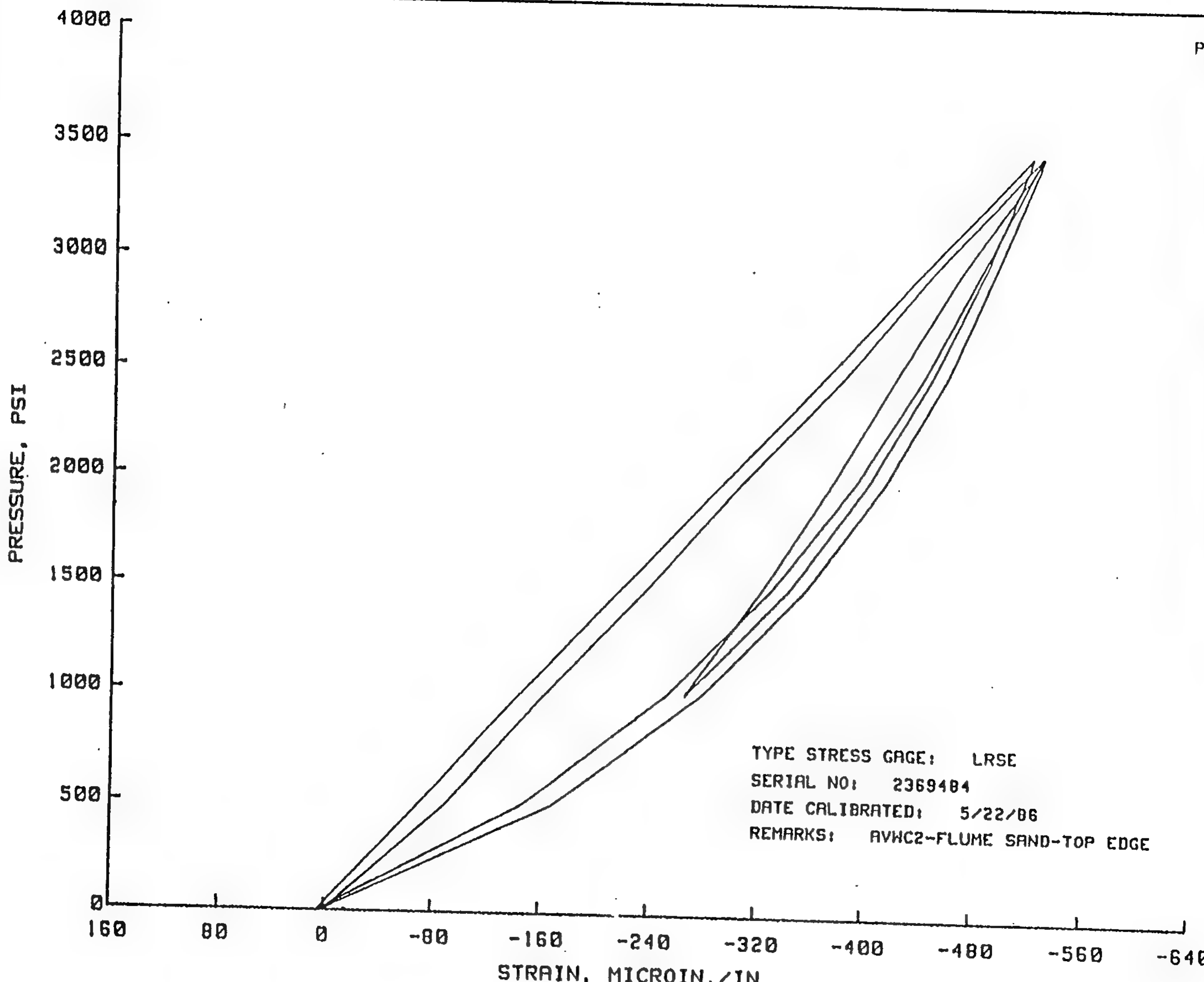
PRESSURE	STRAIN
0	0.0
500	217.8
1000	402.2
1500	573.9
2000	738.7
2500	897.8
3000	1075.2
3500	1267.4
3000	1141.3
2500	1008.7
2000	854.8
1500	680.9
1000	482.6
500	247.4
0	9.1
3500	1310.4
3000	1190.0
2500	1058.7
2000	908.7
1500	737.4
1000	533.5
1500	687.8
2000	838.7
2500	989.6
3000	1140.4
3500	1307.4
3000	1186.1
2500	1062.6
2000	915.7
1500	745.2
1000	545.2
500	292.6
0	7.8

Plate 124



PRESSURE	STRAIN
0	0.0
500	-84.3
1000	-154.3
1500	-215.2
2000	-274.3
2500	-341.3
3000	-406.5
3500	-477.4
3000	-445.7
2500	-415.2
2000	-377.4
1500	-328.3
1000	-263.0
500	-168.3
0	3.0
3500	-478.7
3000	-454.3
2500	-427.0
2000	-390.9
1500	-343.5
1000	-278.3
1500	-317.8
2000	-355.2
2500	-391.7
3000	-433.0
3500	-488.3
3000	-464.3
2500	-438.7
2000	-404.3
1500	-357.0
1000	-293.5
500	-193.5
0	0.0

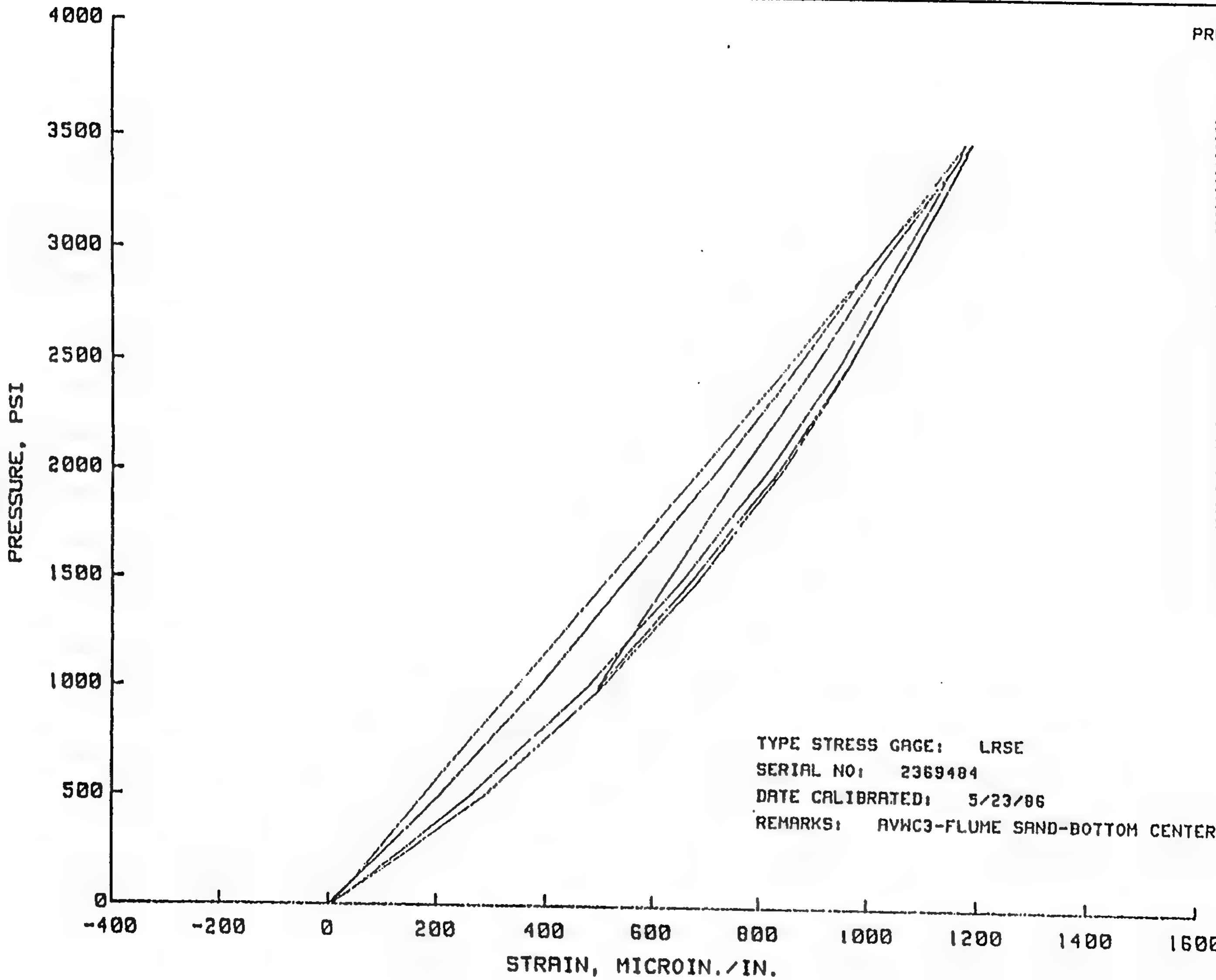
Plate 125



PRESSURE	STRAIN
0	0.0
500	-90.4
1000	-163.9
1500	-239.6
2000	-309.6
2500	-385.2
3000	-453.9
3500	-527.0
3000	-485.7
2500	-443.5
2000	-393.0
1500	-330.9
1000	-252.6
500	-146.1
0	5.2
3500	-521.3
3000	-488.3
2500	-449.6
2000	-402.6
1500	-343.9
1000	-266.5
1500	-324.3
2000	-376.1
2500	-423.5
3000	-473.0
3500	-529.6
3000	-495.7
2500	-460.4
2000	-415.2
1500	-356.1
1000	-278.7
500	-168.3
0	2.6

TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 5/22/86
REMARKS: AVWC2-FLUME SAND-TOP EDGE

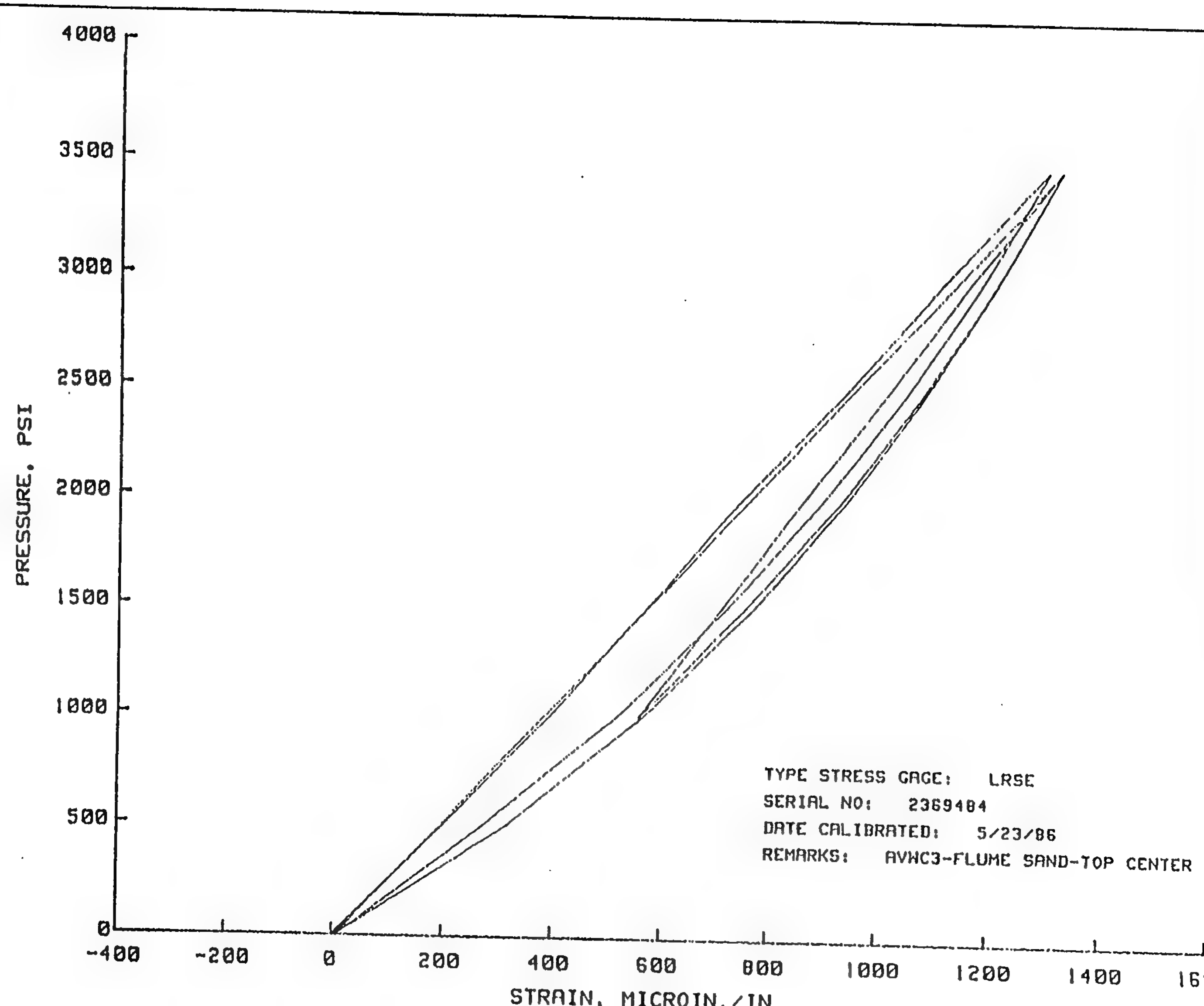
Plate 126



PRESSURE	STRAIN
0	0.0
500	206.5
1000	307.8
1500	551/3
2000	718.7
2500	874.3
3000	1027.0
3500	1183.5
3000	1068.7
2500	949.6
2000	812.2
1500	654.8
1000	475.7
500	261.7
0	6.1
3500	1196.5
3000	1085.2
2500	965.7
2000	831.7
1500	673.0
1000	497.4
1500	630.0
2000	763.0
2500	904.8
3000	1040.9
3500	1192.6
3000	1083.9
2500	969.1
2000	838.7
1500	685.7
1000	503.0
500	287.8
0	5.2

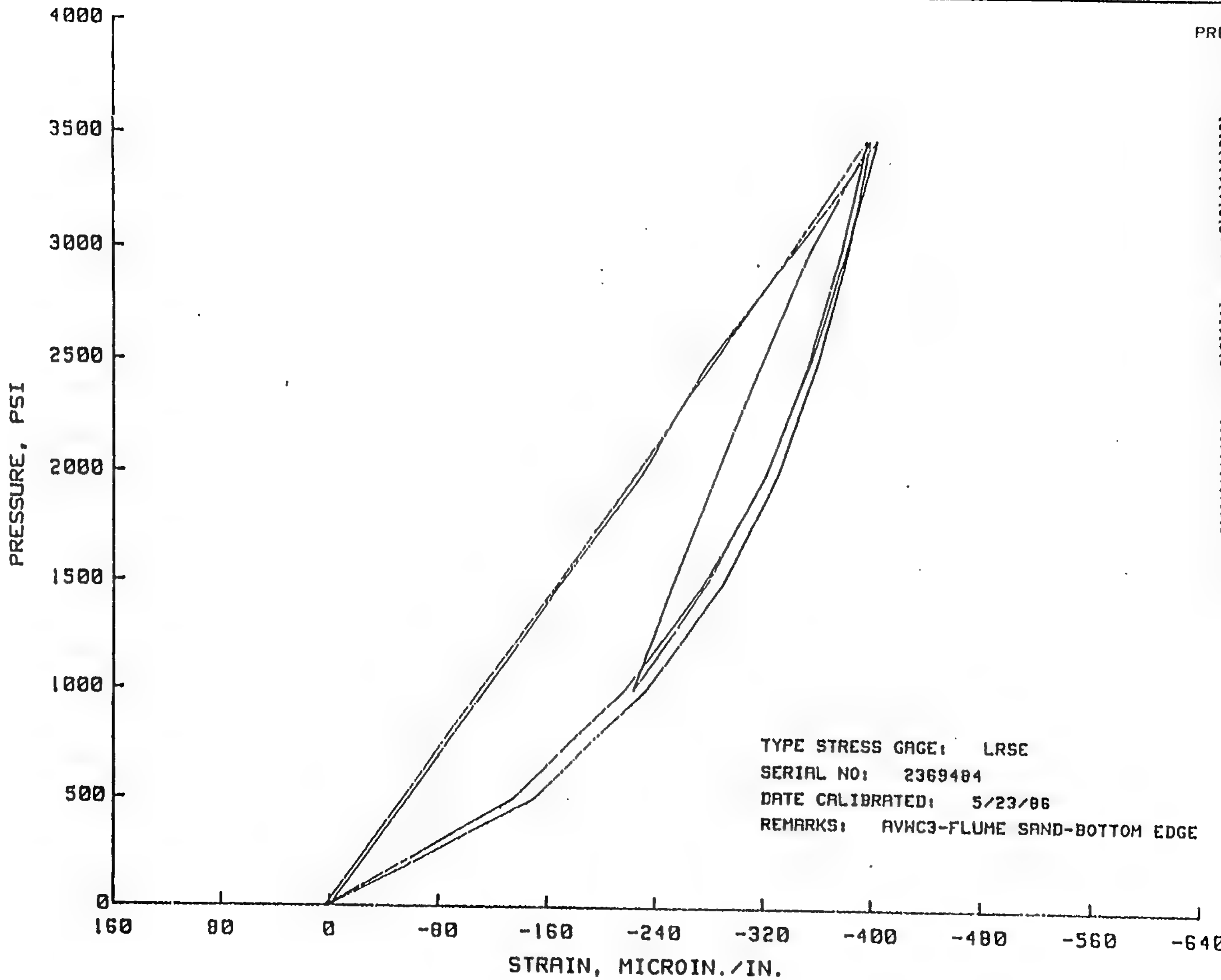
Plate 127

Plate 128



TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 5/23/86
REMARKS: AVWC3-FLUME SAND-TOP CENTER

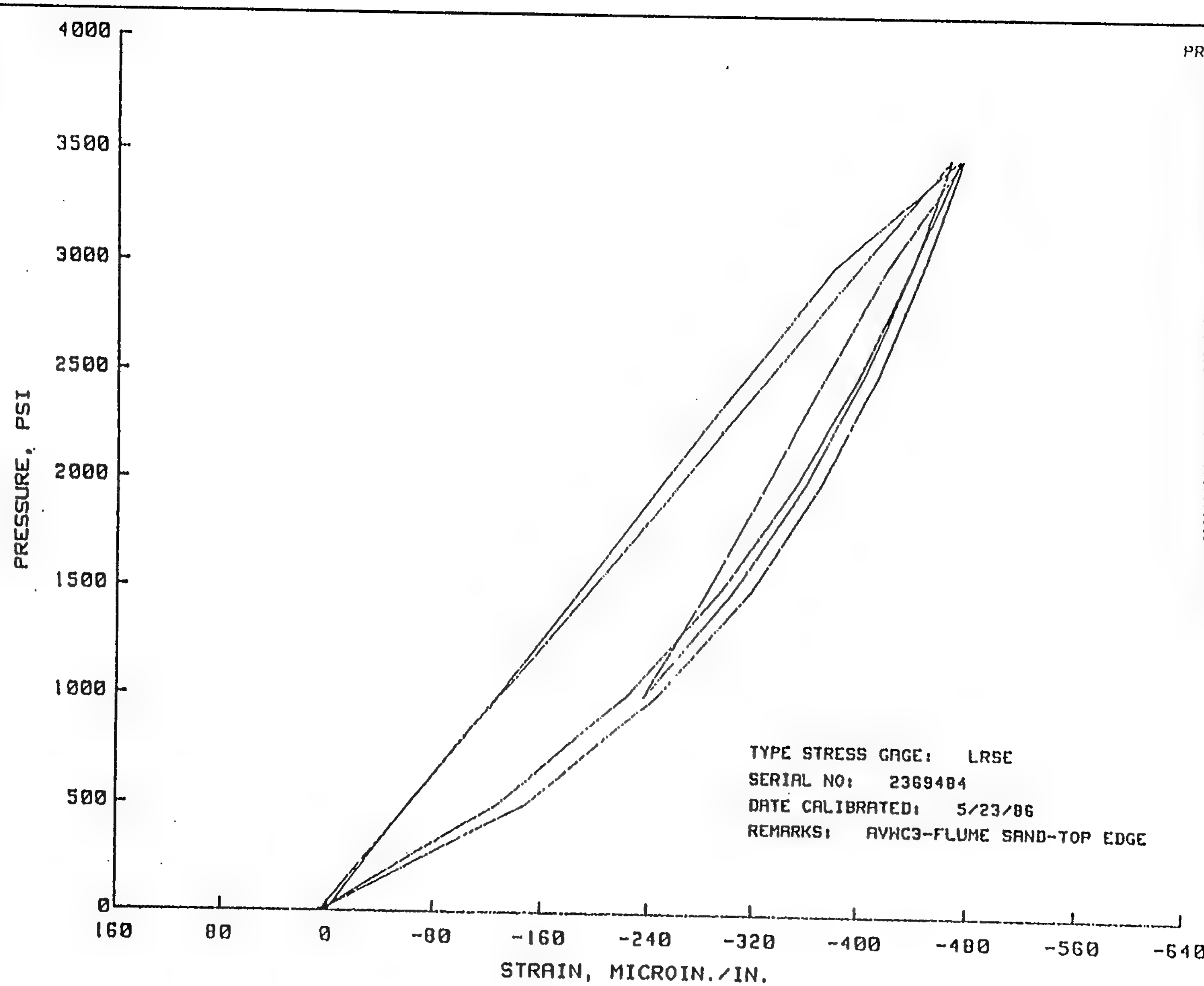
PRESSURE	STRAIN
0	0.0
500	201.3
1000	395.2
1500	571.3
2000	740.3
2500	941.3
3000	1117.0
3500	1307.0
3000	1186.1
2500	1052.2
2000	898.3
1500	719.6
1000	515.7
500	273.0
.0	6.5
3500	1331.3
3000	1213.0
2500	1081.3
2000	932.6
1500	754.3
1000	556.1
1500	711.7
2000	863.0
2500	1018.3
3000	1166.1
3500	1331.3
3000	1213.0
2500	1087.0
2000	941.7
1500	770.0
1000	563.0
500	315.2
0	5.2



PRESSURE	STRAIN
0	0.0
500	-57.8
1000	-115.7
1500	-171.3
2000	-230.9
2500	-280.0
3000	-343.5
3500	-406.5
3000	-381.7
2500	-355.2
2000	-321.7
1500	-276.5
1000	-217.0
500	-134.3
0	3.5
3500	-398.7
3000	-378.3
2500	-353.5
2000	-321.7
1500	-270.7
1000	-223.5
1500	-253.9
2000	-286.1
2500	-319.6
3000	-355.2
3500	-401.3
3000	-383.5
2500	-360.4
2000	-330.4
1500	-290.4
1000	-232.6
500	-149.6
0	1.3

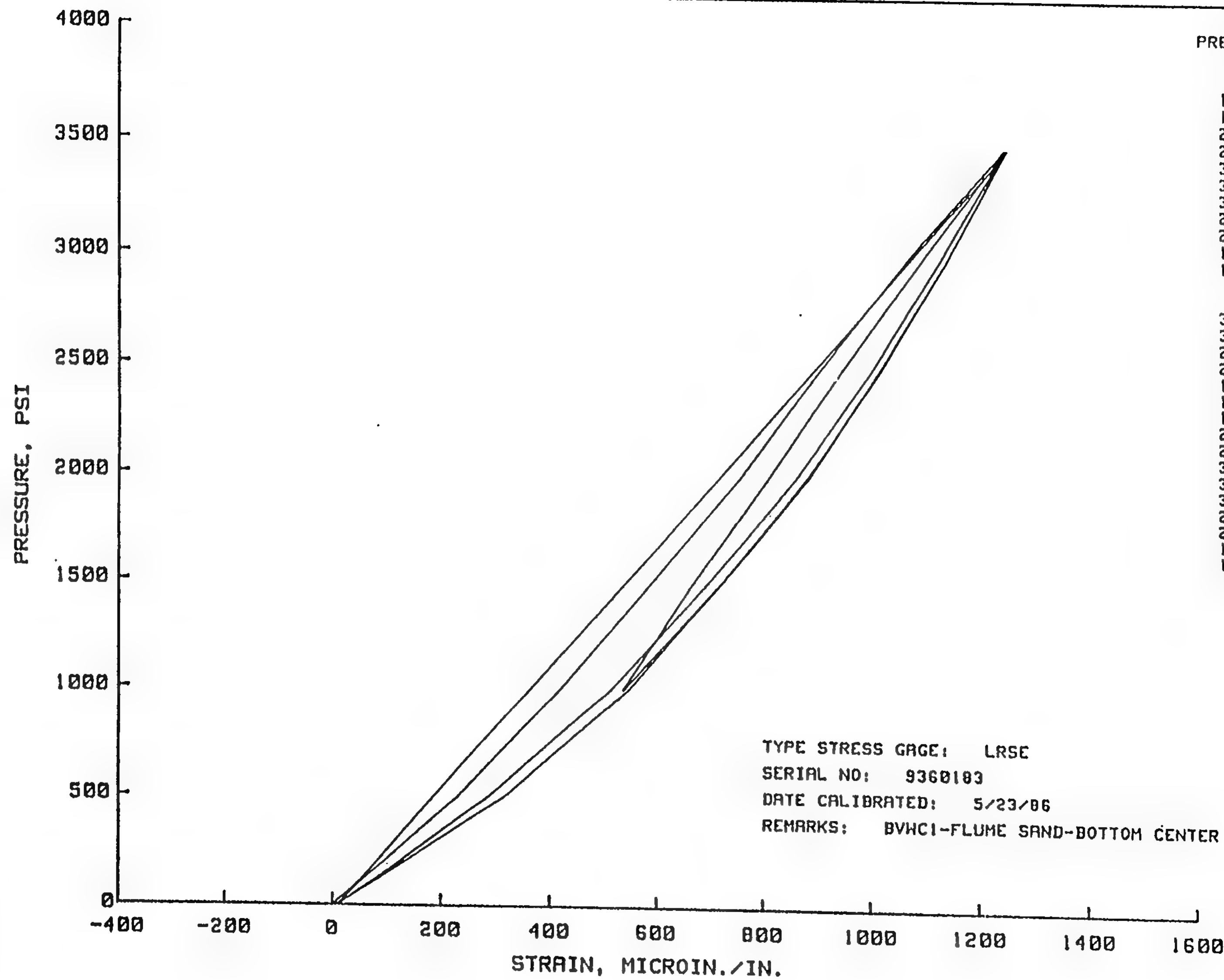
TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 5/23/86
REMARKS: AVWC3-FLUME SAND-BOTTOM EDGE

Plate 129



PRESSURE	STRAIN
0	0.0
500	-61.7
1000	-120.3
1500	-190.4
2000	-251.3
2500	-316.1
3000	-382.2
3500	-474.8
3000	-438.7
2500	-400.4
2000	-353.9
1500	-295.2
1000	-222.6
500	-127.4
0	5.2
3500	-468.3
3000	-439.6
2500	-403.9
2000	-360.9
1500	-305.2
1000	-236.1
1500	-285.7
2000	-331.3
2500	-376.1
3000	-421.7
3500	-477.8
3000	-447.8
2500	-414.3
2000	-372.6
1500	-318.7
1000	-245.7
500	-147.8
0	4.3

Plate 130



PRESSURE	STRAIN
0	0.0
500	231.7
1000	419.6
1500	589.6
2000	757.0
2500	906.1
3000	1066.5
3500	1243.9
3000	1126.5
2500	1000.9
2000	860.0
1500	694.0
1000	512.2
500	286.5
0	9.6
3500	1250.4
3000	1130.3
2500	1018.3
2000	879.6
1500	719.1
1000	535.7
1500	668.7
2000	809.6
2500	947.0
3000	1094.3
3500	1246.1
3000	1139.1
2500	1014.0
2000	883.9
1500	720.9
1000	544.0
500	315.2
0	6.1

Plate 131

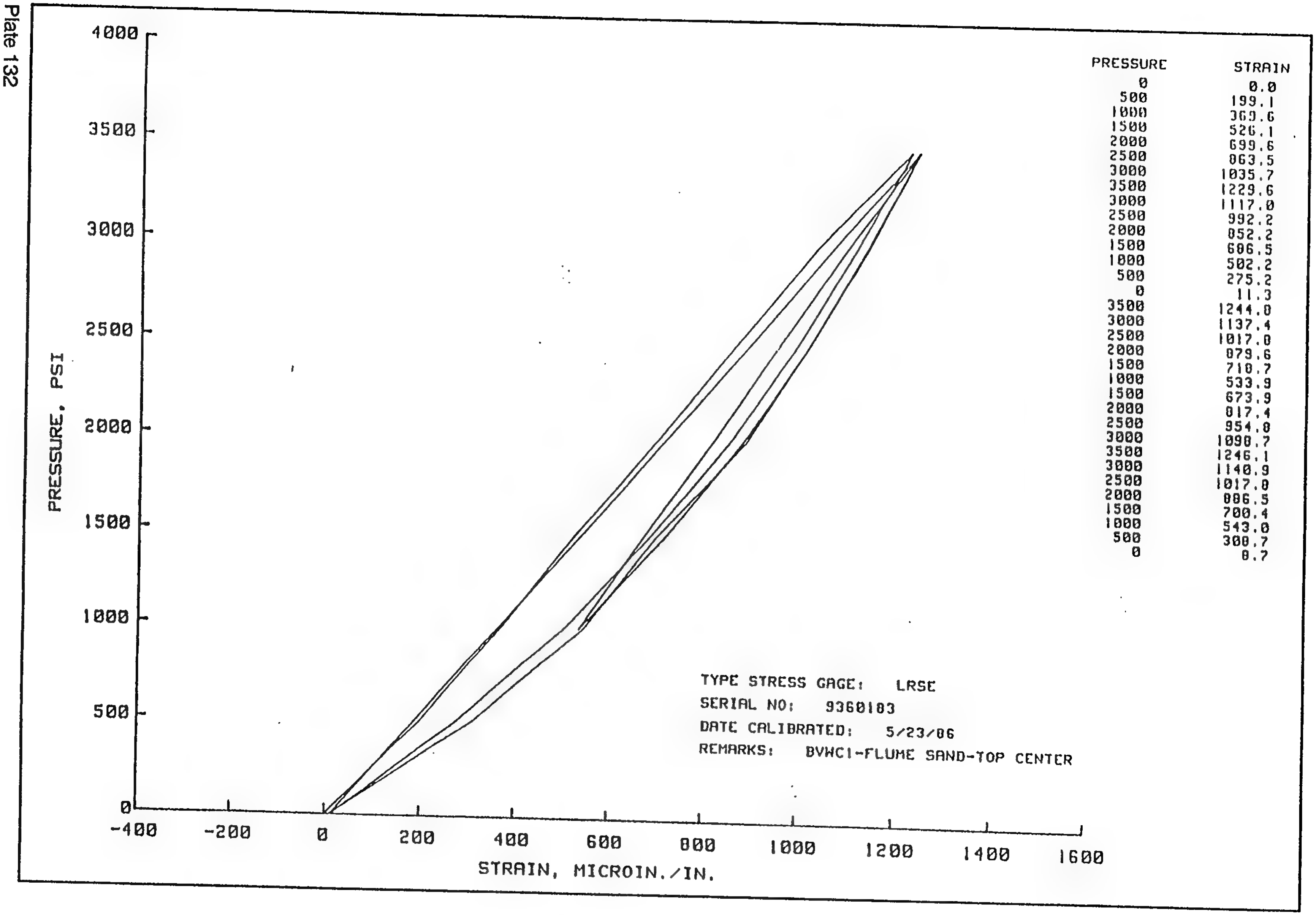
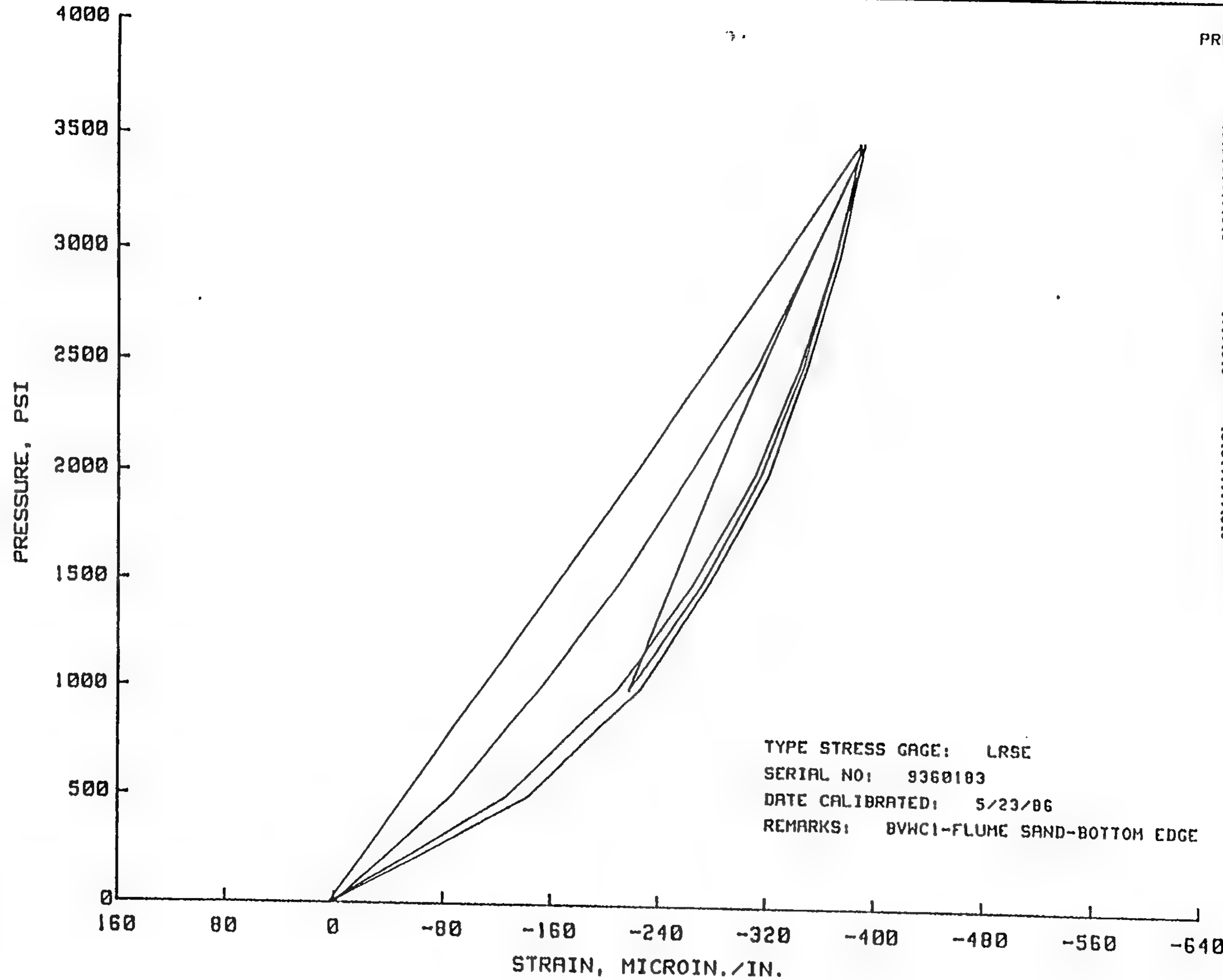
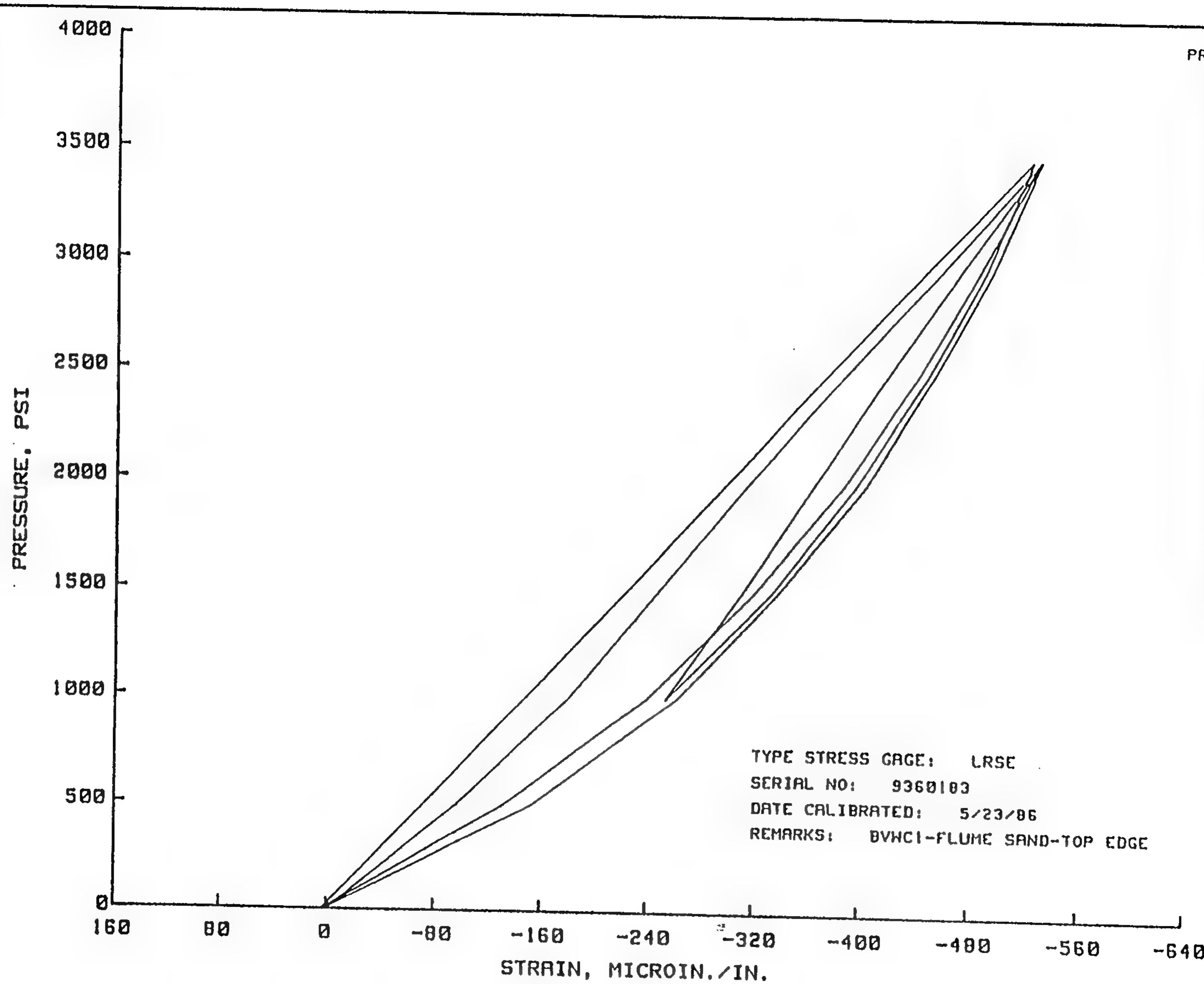

PRESSURE, PSI
STRAIN, MICROIN./IN.
4000
3500
3000
2500
2000
1500
1000
500
0
-400
-200
0
200
400
600
800
1000
1200
1400
1600
PRESSURE STRAIN
0 0.0
500 199.1
1000 369.6
1500 526.1
2000 699.6
2500 863.5
3000 1035.7
3500 1229.6
3000 1117.0
2500 992.2
2000 852.2
1500 686.5
1000 502.2
500 275.2
0 11.3
3500 1244.0
3000 1137.4
2500 1017.0
2000 879.6
1500 710.7
1000 533.9
1500 673.9
2000 817.4
2500 954.8
3000 1098.7
3500 1246.1
3000 1140.9
2500 1017.0
2000 886.5
1500 700.4
1000 543.0
500 300.7
0 8.7
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 5/23/86
REMARKS: BVHCI-FLUME SAND-TOP CENTER

Plate 132



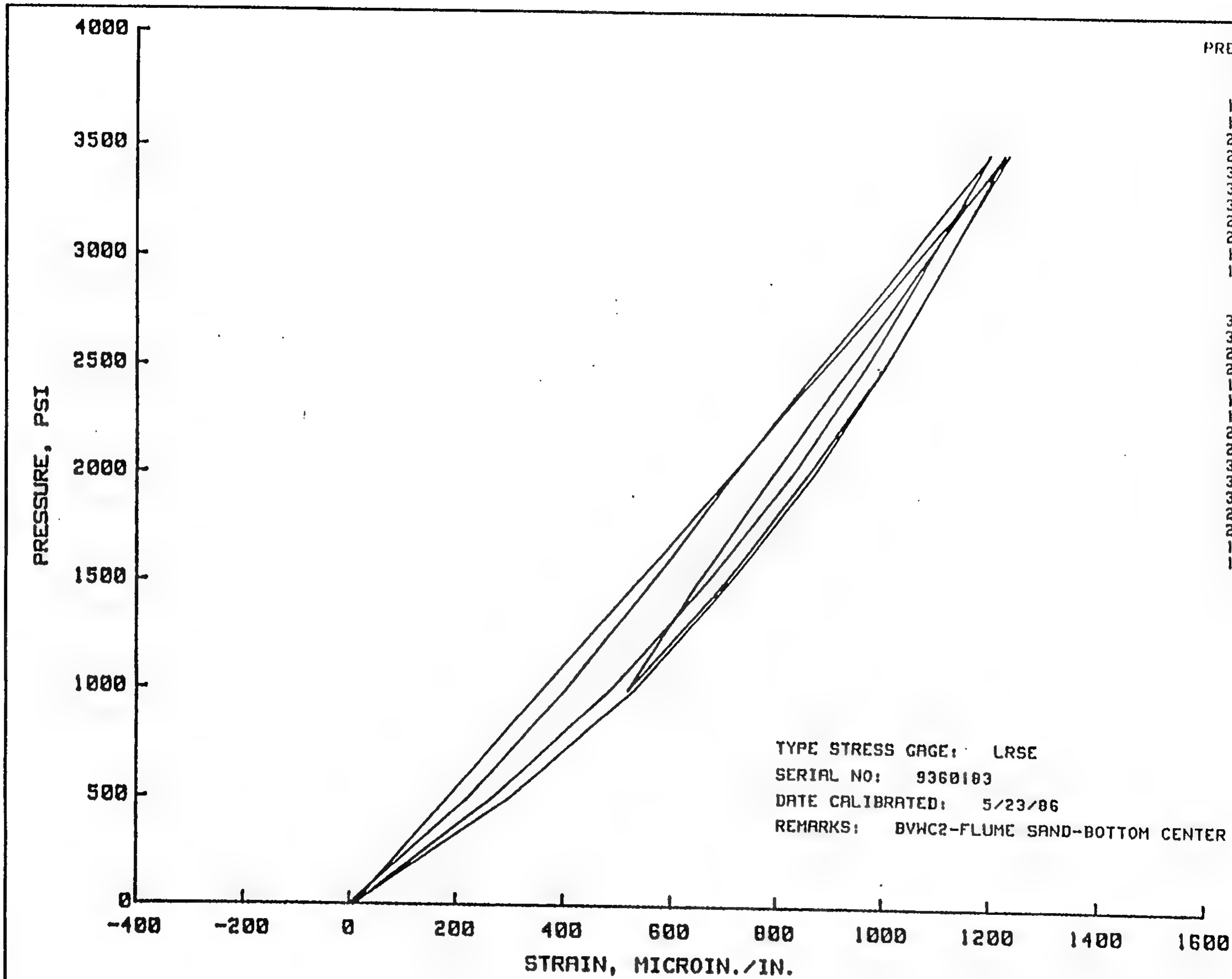
PRESSURE	STRAIN
0	0.0
500	-86.5
1000	-152.2
1500	-211.3
2000	-262.6
2500	-313.5
3000	-353.9
3500	-393.9
3000	-371.3
2500	-344.0
2000	-311.3
1500	-266.1
1000	-209.1
500	-127.0
0	3.9
3500	-390.9
3000	-371.7
2500	-347.4
2000	-315.7
1500	-273.0
1000	-217.0
1500	-250.4
2000	-283.0
2500	-317.0
3000	-354.3
3500	-393.9
3000	-374.0
2500	-350.4
2000	-321.3
1500	-277.0
1000	-225.7
500	-143.0
0	2.6

Plate 133



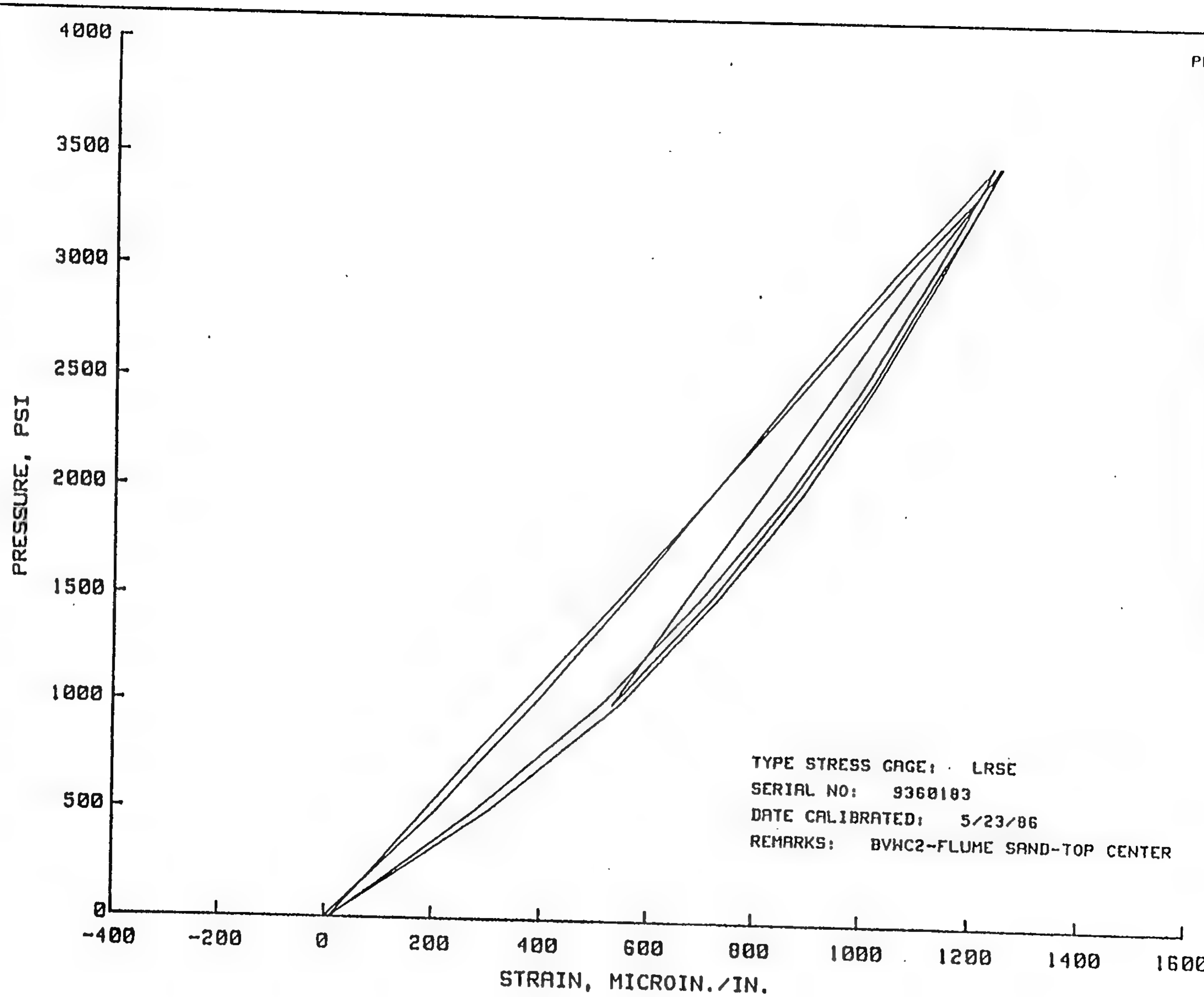
PRESSURE	STRAIN
0	0.0
500	-96.5
1000	-180.4
1500	-247.4
2000	-315.7
2500	-388.3
3000	-461.7
3500	-532.2
3000	-488.3
2500	-442.6
2000	-388.3
1500	-319.6
1000	-238.7
500	-131.3
0	3.9
3500	-526.5
3000	-492.6
2500	-449.6
2000	-397.4
1500	-333.0
1000	-253.5
1500	-310.9
2000	-366.1
2500	-420.4
3000	-475.2
3500	-533.0
3000	-497.4
2500	-453.9
2000	-404.8
1500	-337.8
1000	-261.3
500	-152.2
0	2.2

Plate 134



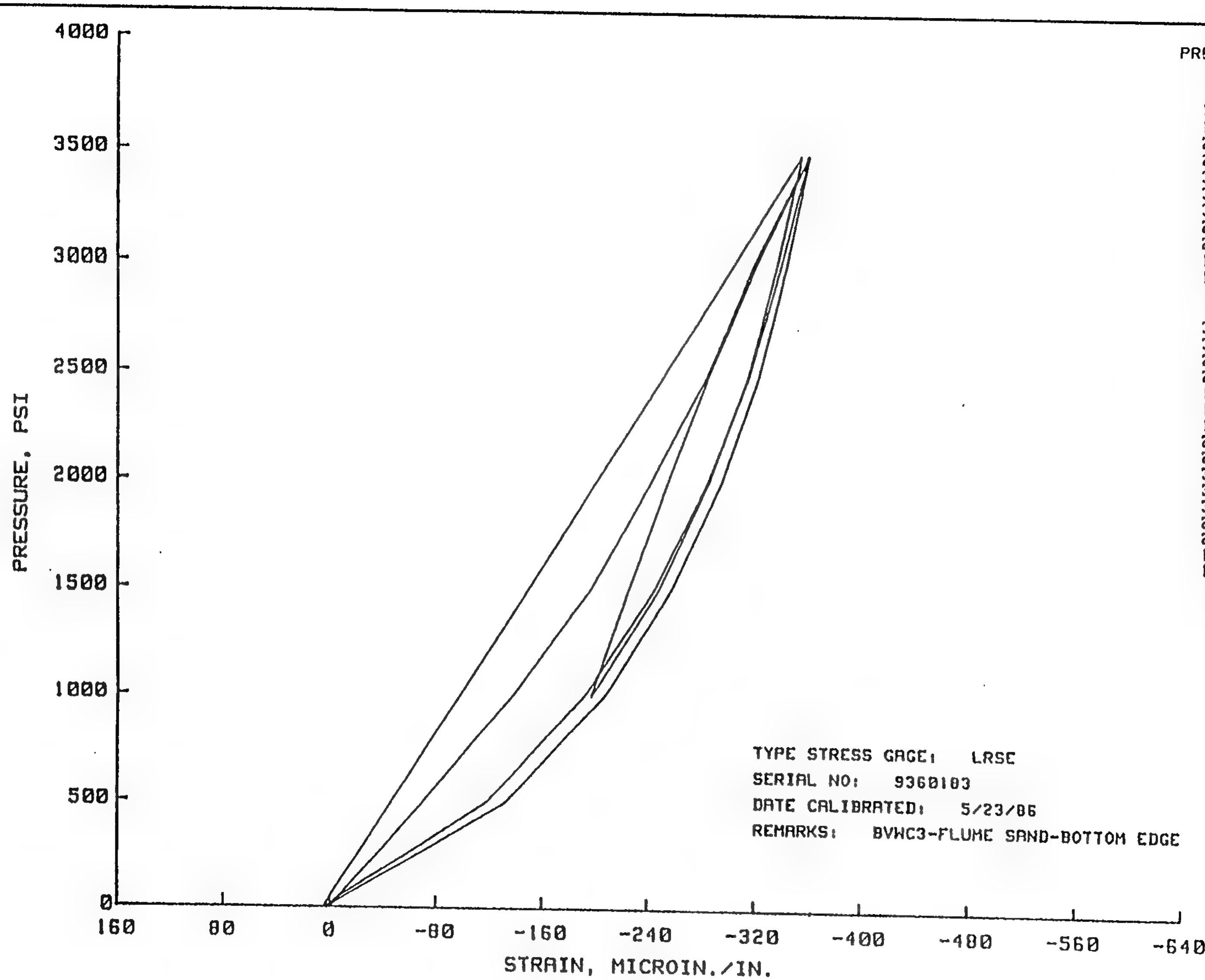
PRESSURE	STRAIN
0	0.0
500	223.0
1000	404.8
1500	564.3
2000	717.8
2500	878.7
3000	1047.0
3500	1207.0
3000	1089.1
2500	966.1
2000	828.3
1500	665.7
1000	486.5
500	267.0
0	8.7
3500	1241.3
3000	1121.3
2500	1000.4
2000	857.4
1500	700.9
1000	519.1
1500	650.9
2000	793.0
2500	938.3
3000	1084.3
3500	1232.6
3000	1122.6
2500	1002.6
2000	868.7
1500	709.1
1000	530.4
500	298.7
0	7.0

Plate 135



PRESSURE	STRAIN
0	0.0
500	200.3
1000	380.3
1500	556.1
2000	722.2
2500	006.1
3000	1060.9
3500	1239.1
3000	1127.8
2500	1003.0
2000	862.2
1500	696.1
1000	510.4
500	279.6
0	9.1
3500	1255.2
3000	1137.4
2500	1017.4
2000	873.9
1500	716.1
1000	532.2
1500	670.4
2000	816.1
2500	960.4
3000	1102.2
3500	1250.0
3000	1144.3
2500	1024.8
2000	890.0
1500	720.3
1000	544.8
500	304.3
0	7.8

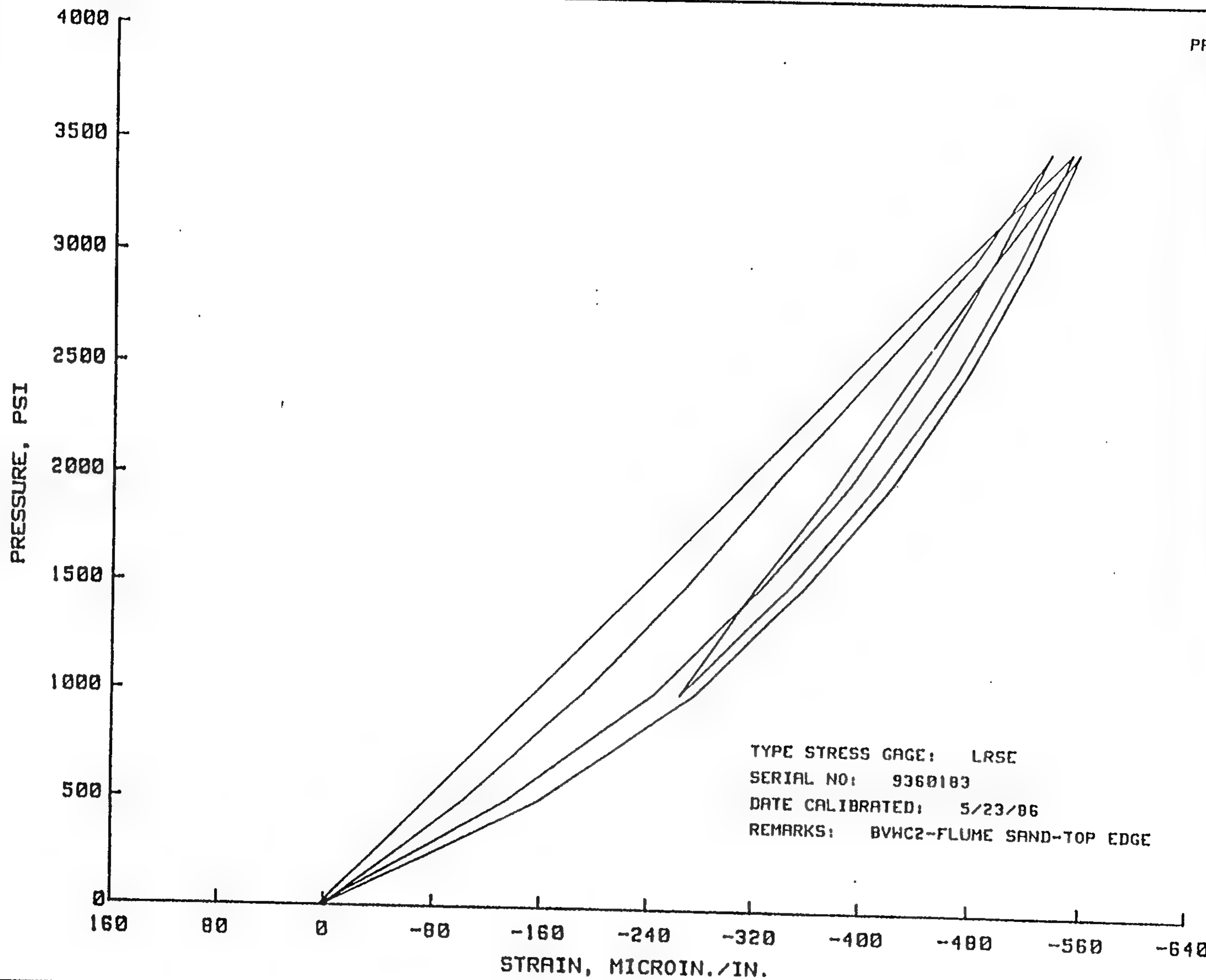
Plate 136



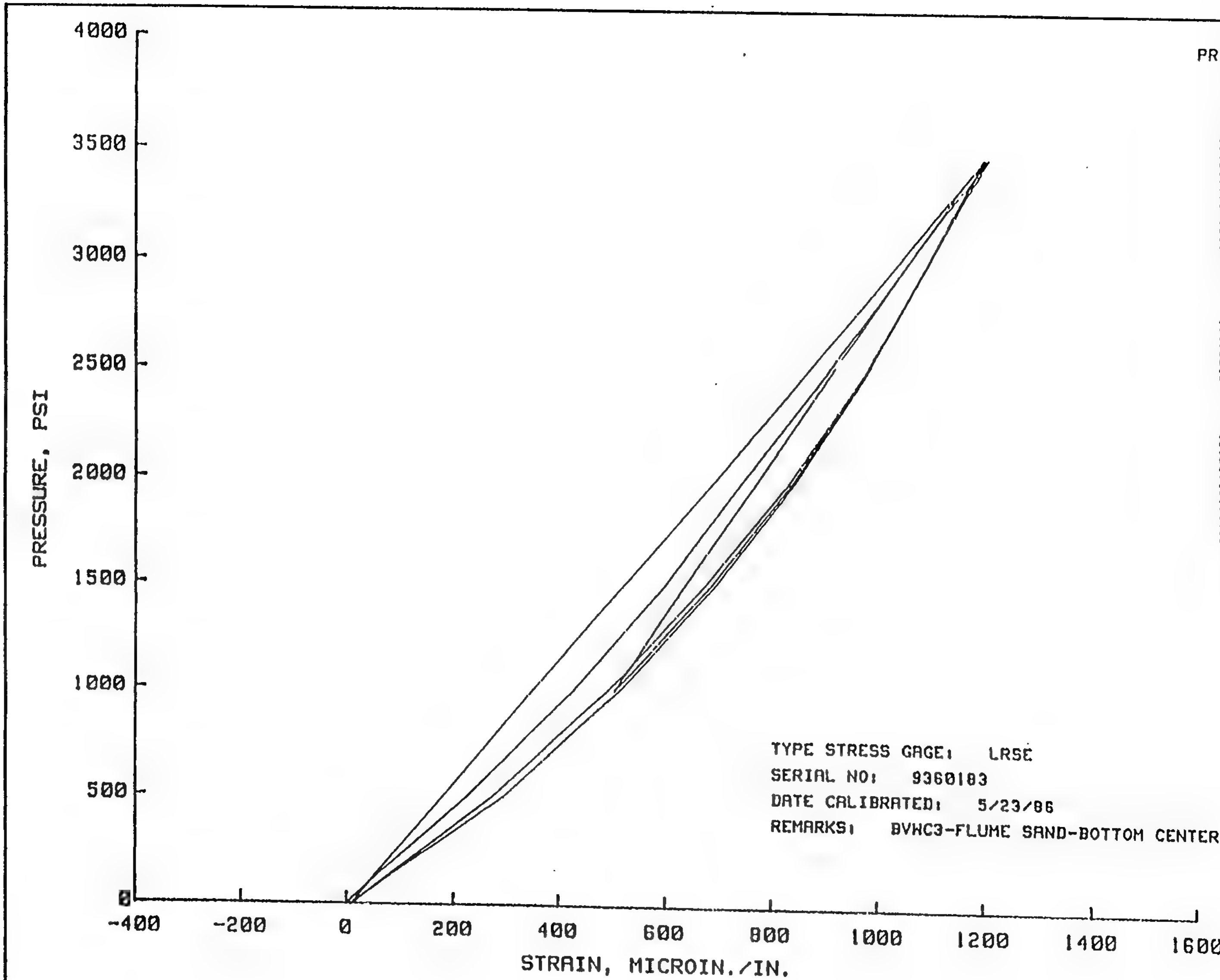
PRESSURE	STRAIN
0	0.0
500	-70.4
1000	-137.0
1500	-197.4
2000	-243.0
2500	-285.7
3000	-320.0
3500	-362.2
3000	-340.4
2500	-316.5
2000	-285.2
1500	-245.2
1000	-192.2
500	-117.8
0	5.2
3500	-357.0
3000	-337.4
2500	-315.7
2000	-286.5
1500	-248.7
1000	-197.4
1500	-226.1
2000	-256.1
2500	-287.0
3000	-322.2
3500	-363.0
3000	-344.8
2500	-323.9
2000	-295.7
1500	-258.3
1000	-207.4
500	-132.2
0	2.6

Plate 137

Plate 138

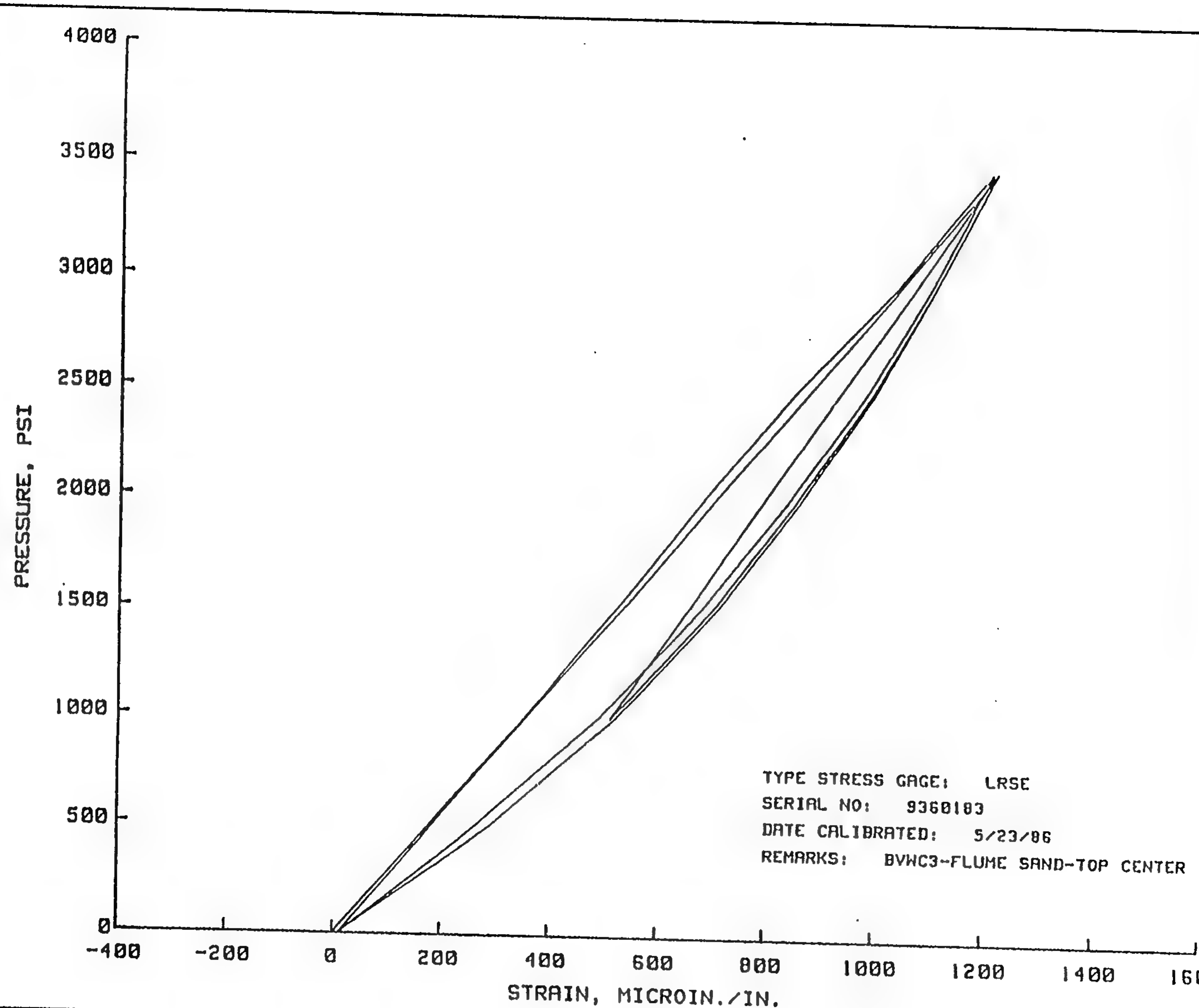


PRESSURE	STRAIN
0	0.0
500	-103.5
1000	-191.3
1500	-260.7
2000	-337.4
2500	-410.9
3000	-482.6
3500	-537.0
3000	-495.7
2500	-440.7
2000	-393.9
1500	-325.7
1000	-243.9
500	-134.8
0	3.5
3500	-553.0
3000	-513.5
2500	-468.7
2000	-412.6
1500	-346.1
1000	-264.3
1500	-322.2
2000	-383.0
2500	-438.7
3000	-496.5
3500	-558.3
3000	-521.7
2500	-477.8
2000	-424.0
1500	-357.4
1000	-275.2
500	-158.7
0	1.3



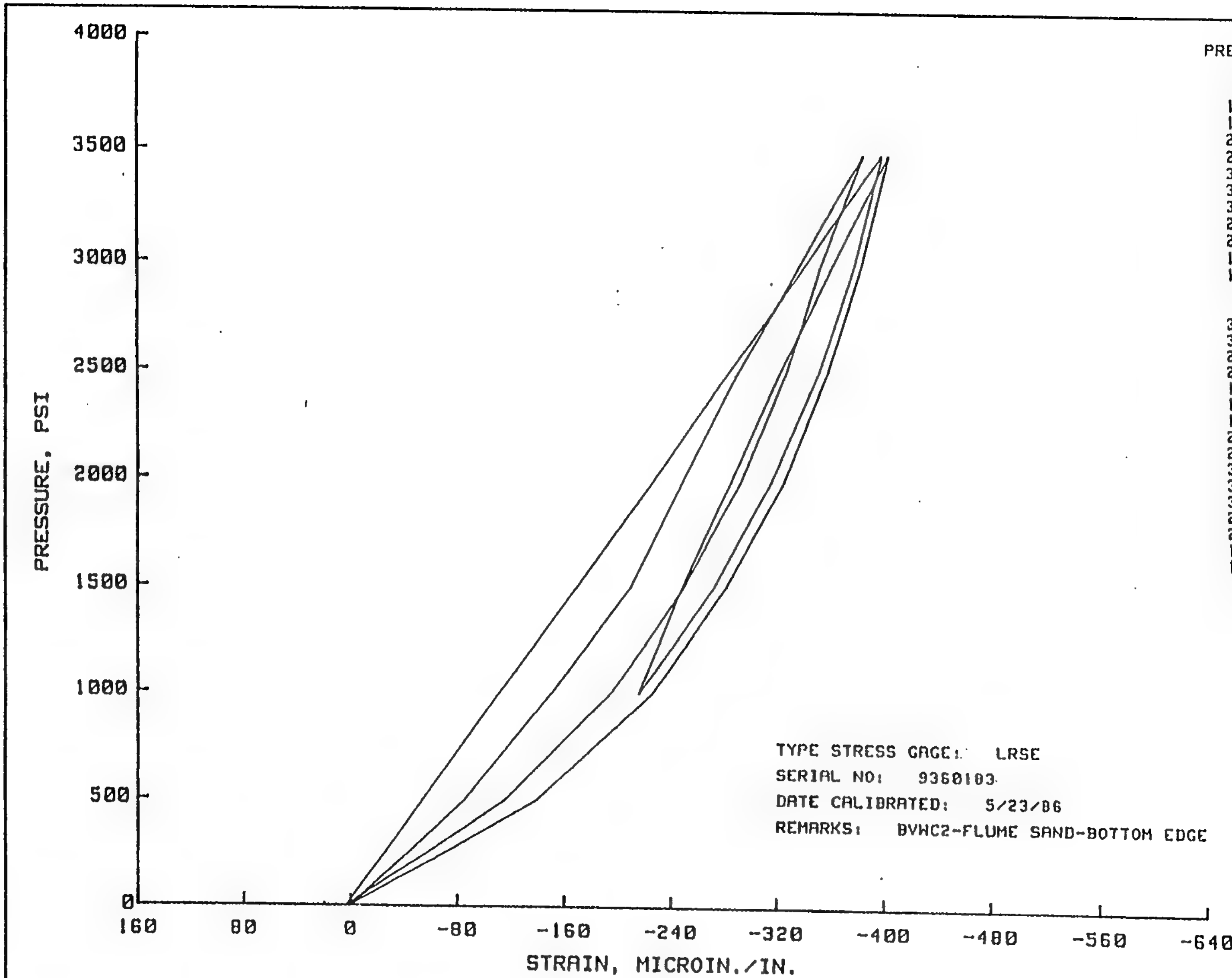
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 5/23/86
REMARKS: BVHC3-FLUME SAND-BOTTOM CENTER

PRESSURE	STRAIN
0	0.0
500	225.7
1000	420.7
1500	590.7
2000	745.7
2500	903.0
3000	1053.9
3500	1211.7
3000	1093.0
2500	973.5
2000	832.6
1500	672.2
1000	491.7
500	273.0
0	9.6
3500	1206.1
3000	1091.7
2500	975.7
2000	830.7
1500	683.9
1000	504.3
1500	636.5
2000	773.5
2500	912.2
3000	1054.0
3500	1201.7
3000	1091.3
2500	970.7
2000	843.9
1500	691.7
1000	513.0
500	293.9
0	7.8



PRESSURE	STRAIN
0	0.0
500	177.8
1000	353.9
1500	519.1
2000	681.7
2500	851.3
3000	1043.9
3500	1213.9
3000	1104.3
2500	982.6
2000	839.1
1500	674.8
1000	489.6
500	264.8
0	18.4
3500	1223.5
3000	1111.3
2500	992.6
2000	854.3
1500	696.5
1000	512.2
1500	653.8
2000	794.8
2500	934.8
3000	1077.4
3500	1220.9
3000	1112.2
2500	997.8
2000	861.7
1500	705.2
1000	520.4
500	292.2
0	8.7

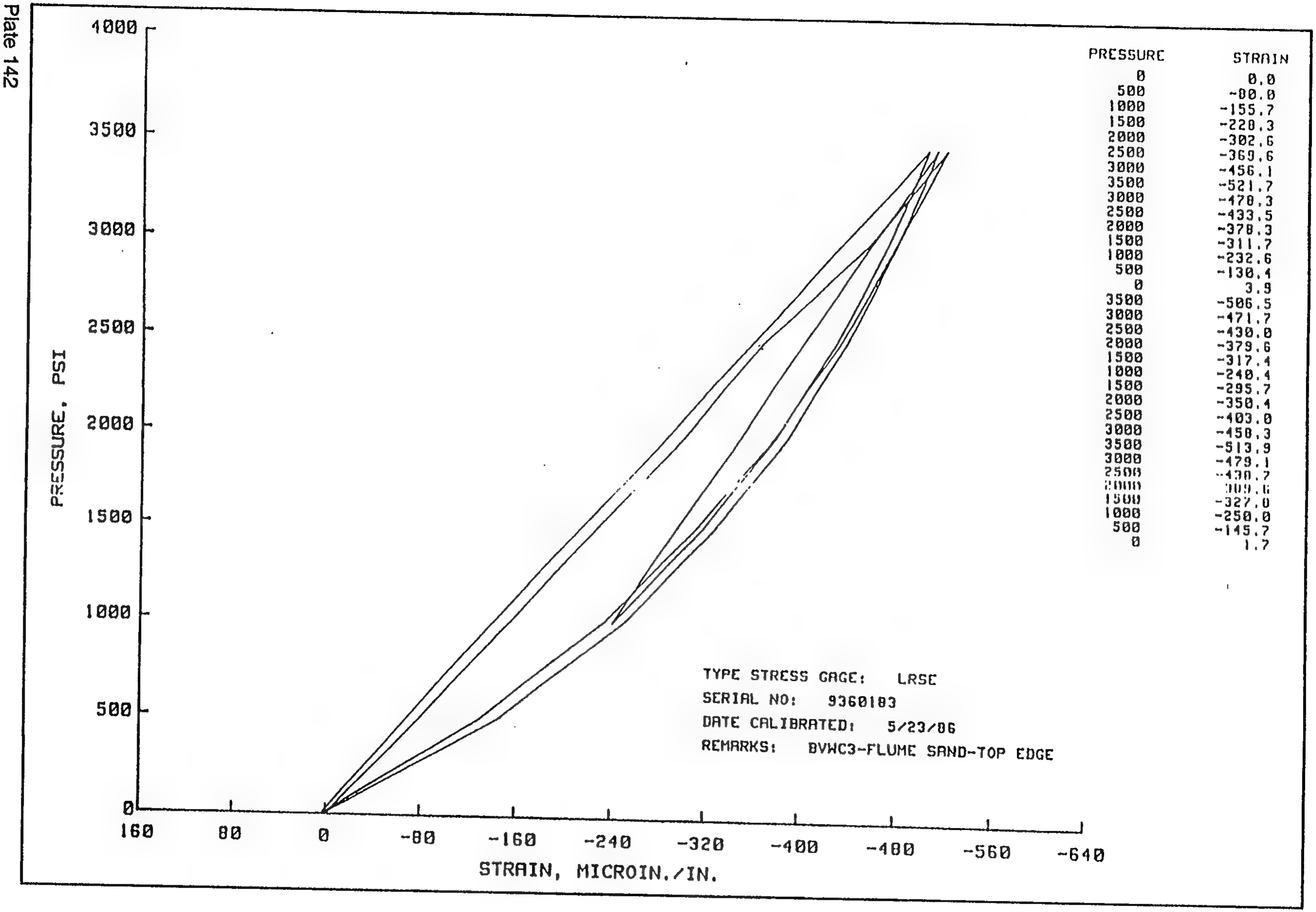
Plate 140



PRESSURE	STRAIN
0	0.0
500	-85.7
1000	-150.9
1500	-209.6
2000	-250.0
2500	-292.2
3000	-338.7
3500	-386.5
3000	-354.3
2500	-327.0
2000	-293.9
1500	-249.6
1000	-194.3
500	-115.7
0	3.5
3500	-400.4
3000	-379.1
2500	-352.2
2000	-316.5
1500	-272.6
1000	-215.2
1500	-240.7
2000	-287.0
2500	-323.5
3000	-363.5
3500	-405.7
3000	-384.3
2500	-358.7
2000	-326.1
1500	-281.7
1000	-225.2
500	-139.1
0	.9

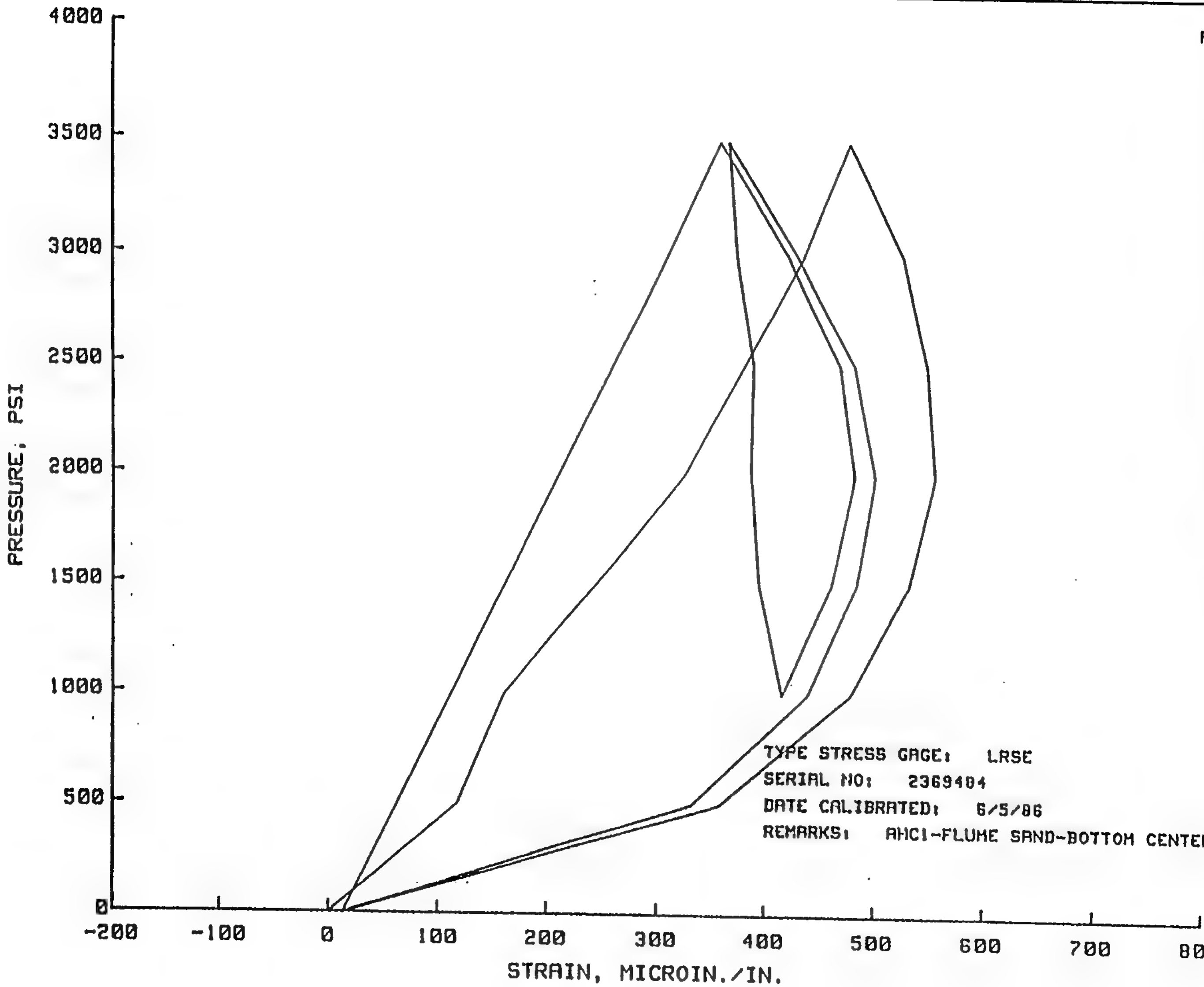
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 5/23/86
REMARKS: BVHC2-FLUME SAND-BOTTOM EDGE

Plate 141



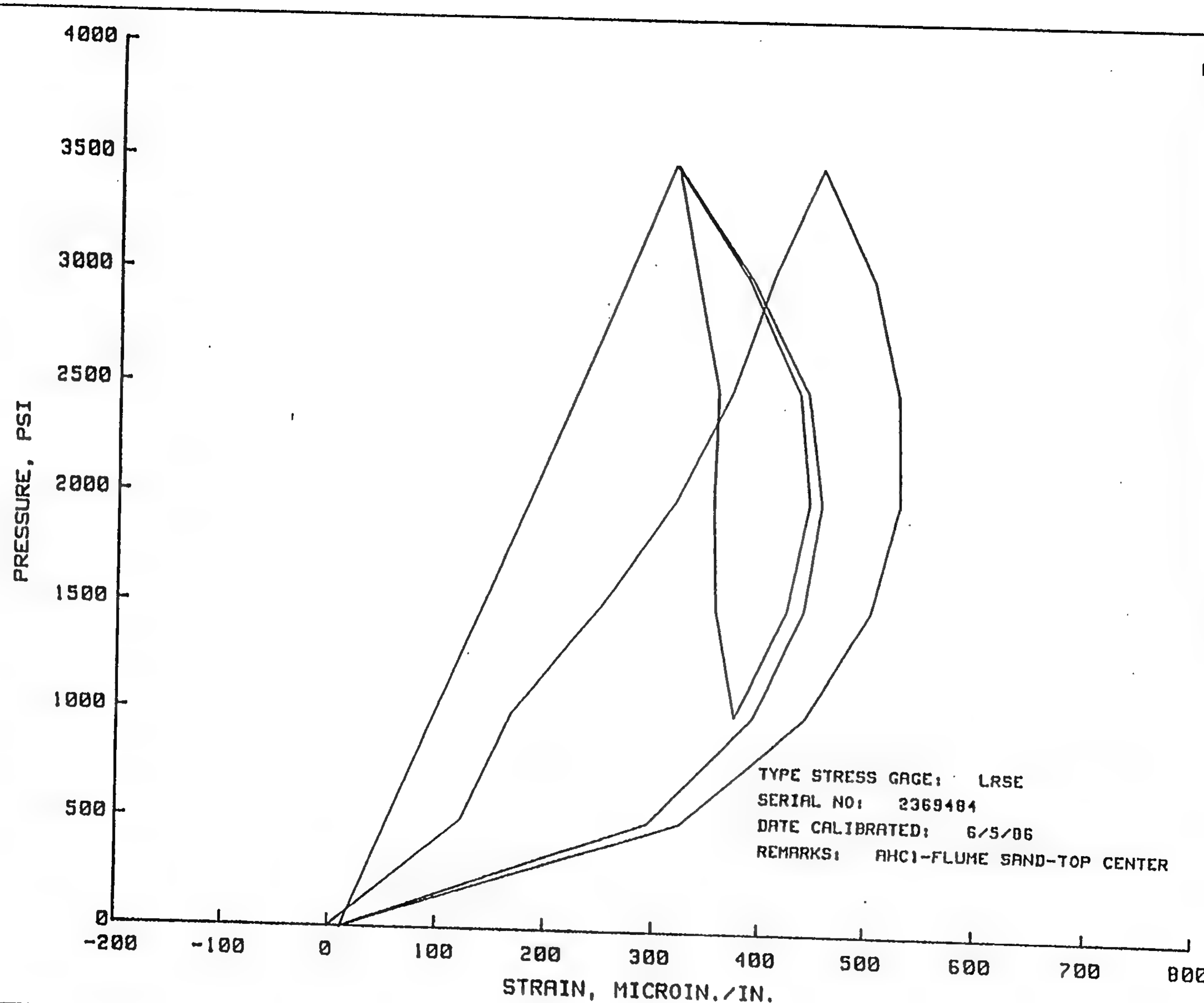
PRESSURE	STRAIN
0	0.0
500	-80.0
1000	-155.7
1500	-220.3
2000	-302.6
2500	-369.6
3000	-456.1
3500	-521.7
3000	-478.3
2500	-433.5
2000	-378.3
1500	-311.7
1000	-232.6
500	-130.4
0	3.9
3500	-506.5
3000	-471.7
2500	-430.0
2000	-379.6
1500	-317.4
1000	-240.4
1500	-295.7
2000	-350.4
2500	-403.0
3000	-458.3
3500	-513.9
3000	-479.1
2500	-430.7
2000	309.6
1500	-327.0
1000	-250.0
500	-145.7
0	1.7

Plate 142



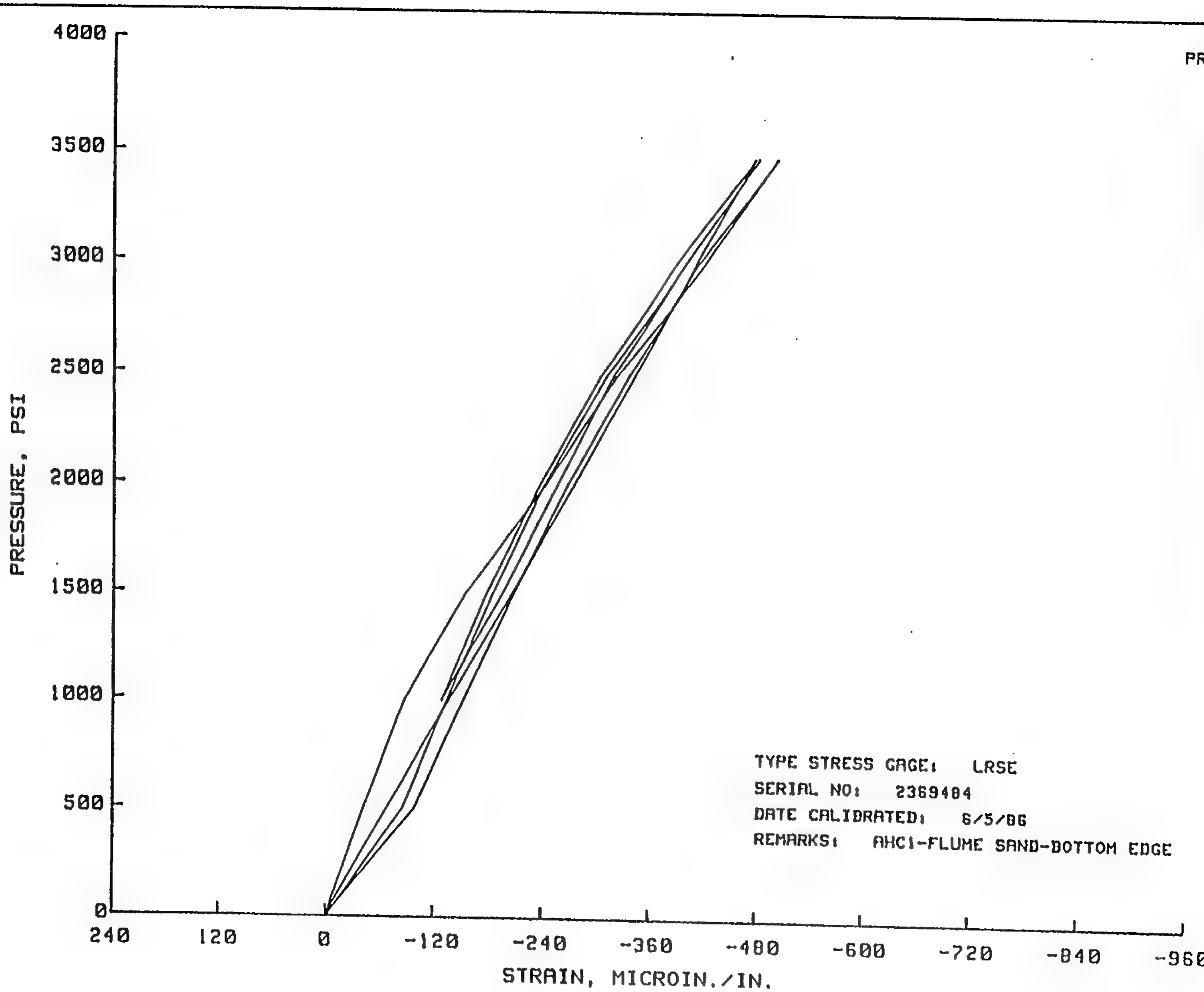
PRESSURE	STRAIN
0	0.0
500	118.3
1000	161.3
1500	245.7
2000	326.5
2500	383.0
3000	437.8
3500	480.4
3000	529.6
2500	551.3
2000	557.8
1500	533.0
1000	478.3
500	357.4
0	13.0
3500	361.3
3000	423.5
2500	478.9
2000	483.9
1500	461.7
1000	415.7
1500	394.0
2000	387.8
2500	390.9
3000	375.2
3500	368.3
3000	432.2
2500	484.3
2000	502.6
1500	484.0
1000	439.1
500	331.3
0	12.6

Plate 143



PRESSURE	STRAIN
0	0.0
500	123.0
1000	169.1
1500	249.1
2000	319.1
2500	371.3
3000	400.3
3500	455.7
3000	505.2
2500	528.7
2000	530.4
1500	503.5
1000	442.2
500	324.0
0	11.7
3500	314.0
3000	385.7
2500	435.7
2000	445.7
1500	423.9
1000	375.2
1500	356.5
2000	353.9
2500	357.0
3000	336.5
3500	316.5
3000	309.1
2500	443.9
2000	457.4
1500	440.4
1000	392.6
500	294.3
0	11.3

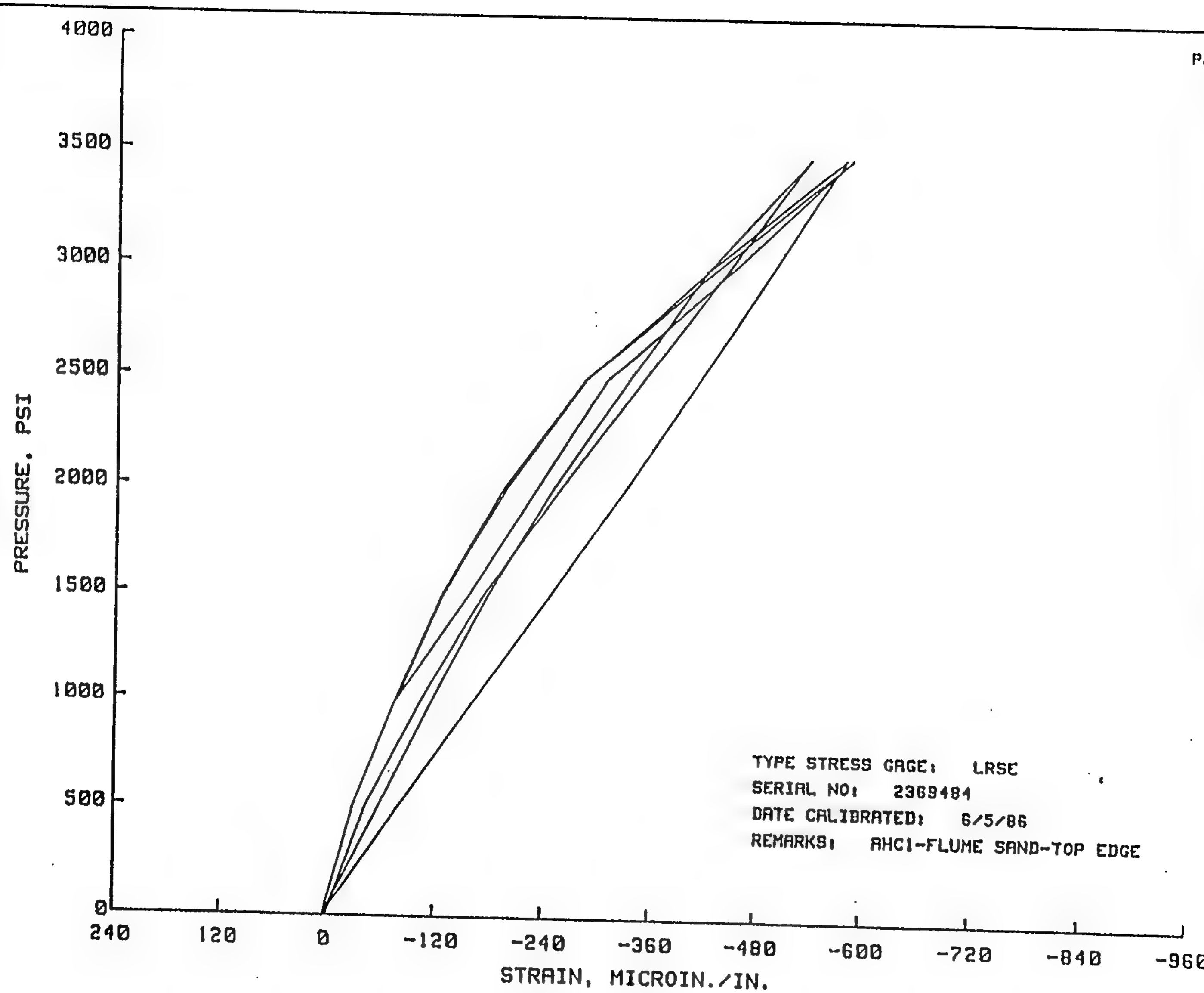
Plate 144



PRESSURE	STRAIN
0	0.0
500	-41.7
1000	-87.4
1500	-154.3
2000	-242.6
2500	-323.0
3000	-421.3
3500	-506.1
3000	-413.5
2500	-336.1
2000	-266.5
1500	-207.0
1000	-151.7
500	-97.0
0	1.3
3500	-480.9
3000	-380.7
2500	-304.3
2000	-235.7
1500	-177.0
1000	-120.3
1500	-195.2
2000	-256.1
2500	-319.1
3000	-400.0
3500	-485.2
3000	-399.1
2500	-310.9
2000	-240.4
1500	-183.9
1000	-133.9
500	-84.0
0	-.4
0	-220.7

TYPE STRESS GAGE: LRSE
SERIAL NO: 2369404
DATE CALIBRATED: 6/5/86
REMARKS: AHCI-FLUME SAND-BOTTOM EDGE

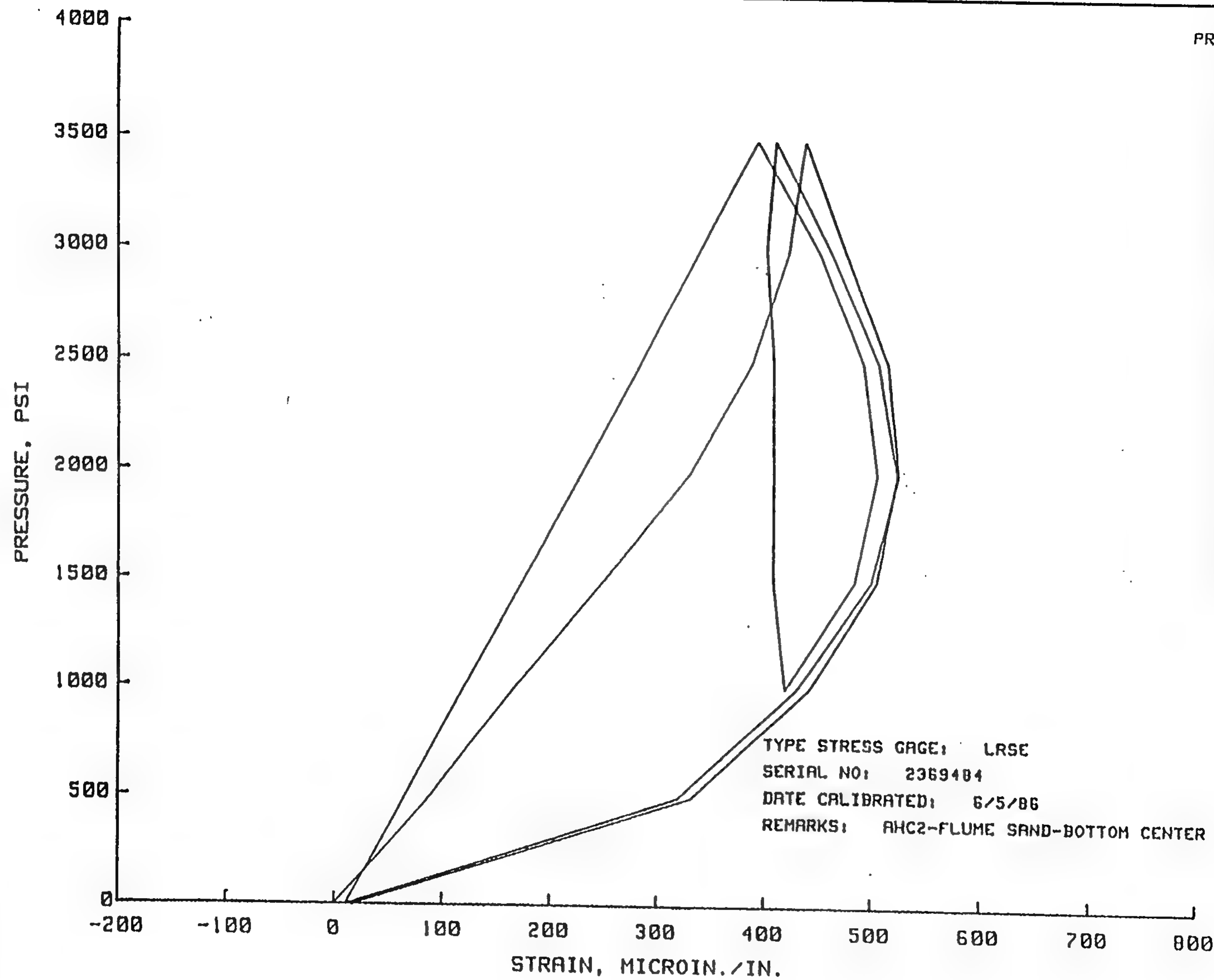
Plate 145



TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 6/5/86
REMARKS: AHCI-FLUME SAND-TOP EDGE

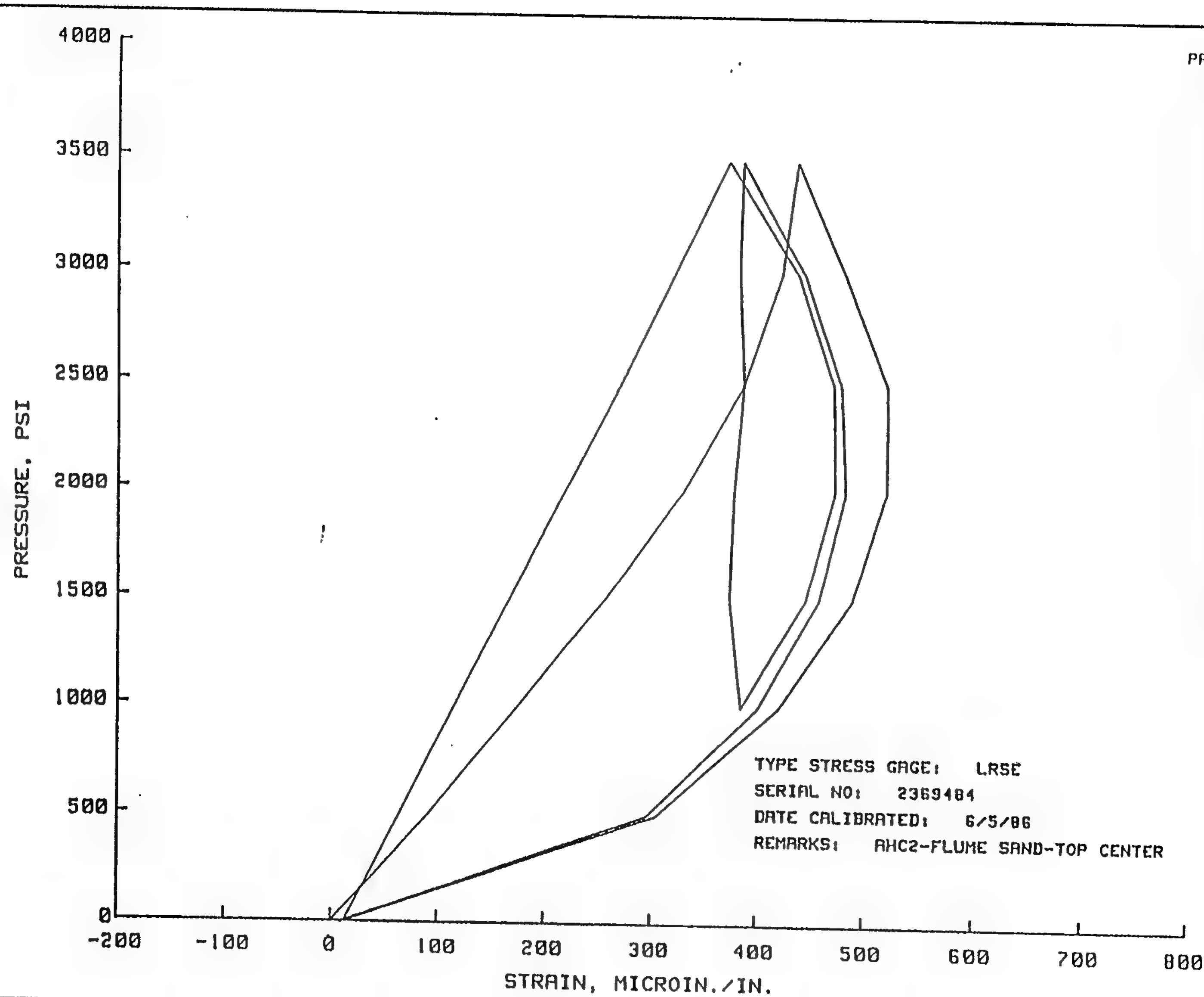
PRESSURE	STRAIN
0	0.0
500	-43.0
1000	-104.8
1500	-173.5
2000	-258.3
2500	-350.0
3000	-447.0
3500	-541.7
3000	-423.9
2500	-333.0
2000	-249.6
1500	-177.8
1000	-116.5
500	-57.4
0	3.9
3500	-581.3
3000	-425.2
2500	-285.2
2000	-197.8
1500	-120.3
1000	-77.0
1500	-157.4
2000	-231.7
2500	-309.6
3000	-452.2
3500	-588.7
3000	-433.0
2500	-284.3
2000	-194.3
1500	-126.5
1000	-75.2
500	-28.7
0	3.9

Plate 146



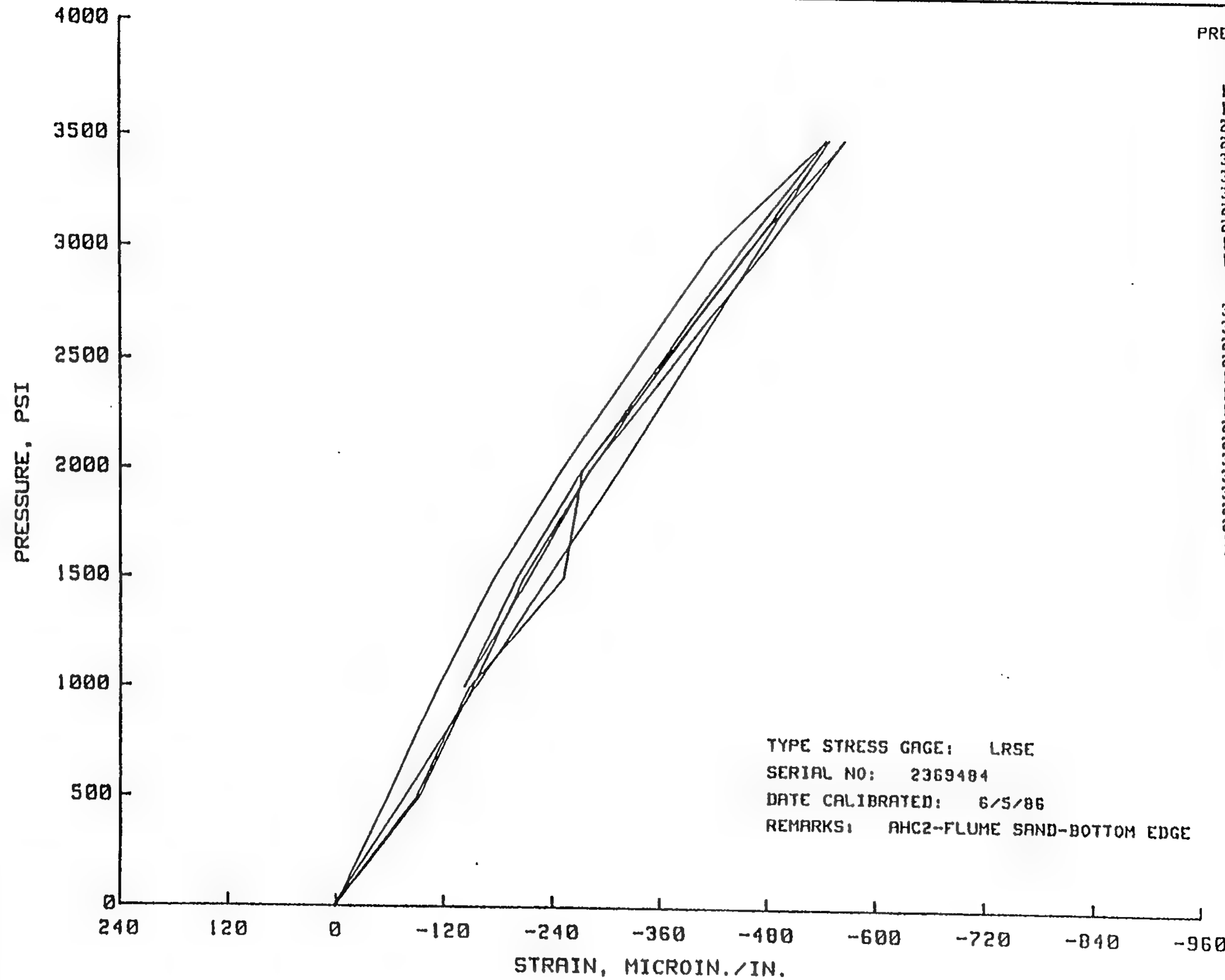
PRESSURE	STRAIN
0	0.0
500	89.1
1000	167.8
1500	251.3
2000	332.6
2500	390.4
3000	425.2
3500	441.3
3000	478.7
2500	517.0
2000	527.4
1500	500.9
1000	430.4
500	320.8
0	10.4
3500	396.5
3000	453.9
2500	494.8
2000	507.4
1500	405.2
1000	419.6
1500	409.1
2000	410.4
2500	410.0
3000	403.9
3500	413.3
3000	465.2
2500	509.1
2000	526.1
1500	506.1
1000	442.2
500	332.2
0	16.5

Plate 147



PRESSURE	STRAIN
0	0.0
500	91.7
1000	175.7
1500	256.5
2000	331.3
2500	380.7
3000	425.2
3500	440.0
3000	484.3
2500	523.5
2000	522.2
1500	489.6
1000	420.9
500	304.0
0	12.2
3500	375.2
3000	440.4
2500	473.5
2000	474.3
1500	446.1
1000	385.2
1500	374.0
2000	379.6
2500	380.7
3000	384.3
3500	388.3
3000	446.5
2500	480.4
2000	484.3
1500	450.7
1000	401.3
500	296.1
0	9.1

Plate 148



PRESSURE	STRAIN
0	0.0
500	-57.4
1000	-114.3
1500	-176.1
2000	-250.9
2500	-334.3
3000	-423.5
3500	-549.1
3000	-453.5
2500	-362.2
2000	-273.5
1500	-252.2
1000	-148.7
500	-89.1
0	3.0
3500	-552.6
3000	-463.5
2500	-368.3
2000	-273.0
1500	-200.4
1000	-142.6
1500	-214.3
2000	-283.0
2500	-365.7
3000	-462.2
3500	-570.0
3000	-479.6
2500	-378.7
2000	-281.3
1500	-208.3
1000	-152.2
500	-92.6
0	1.3

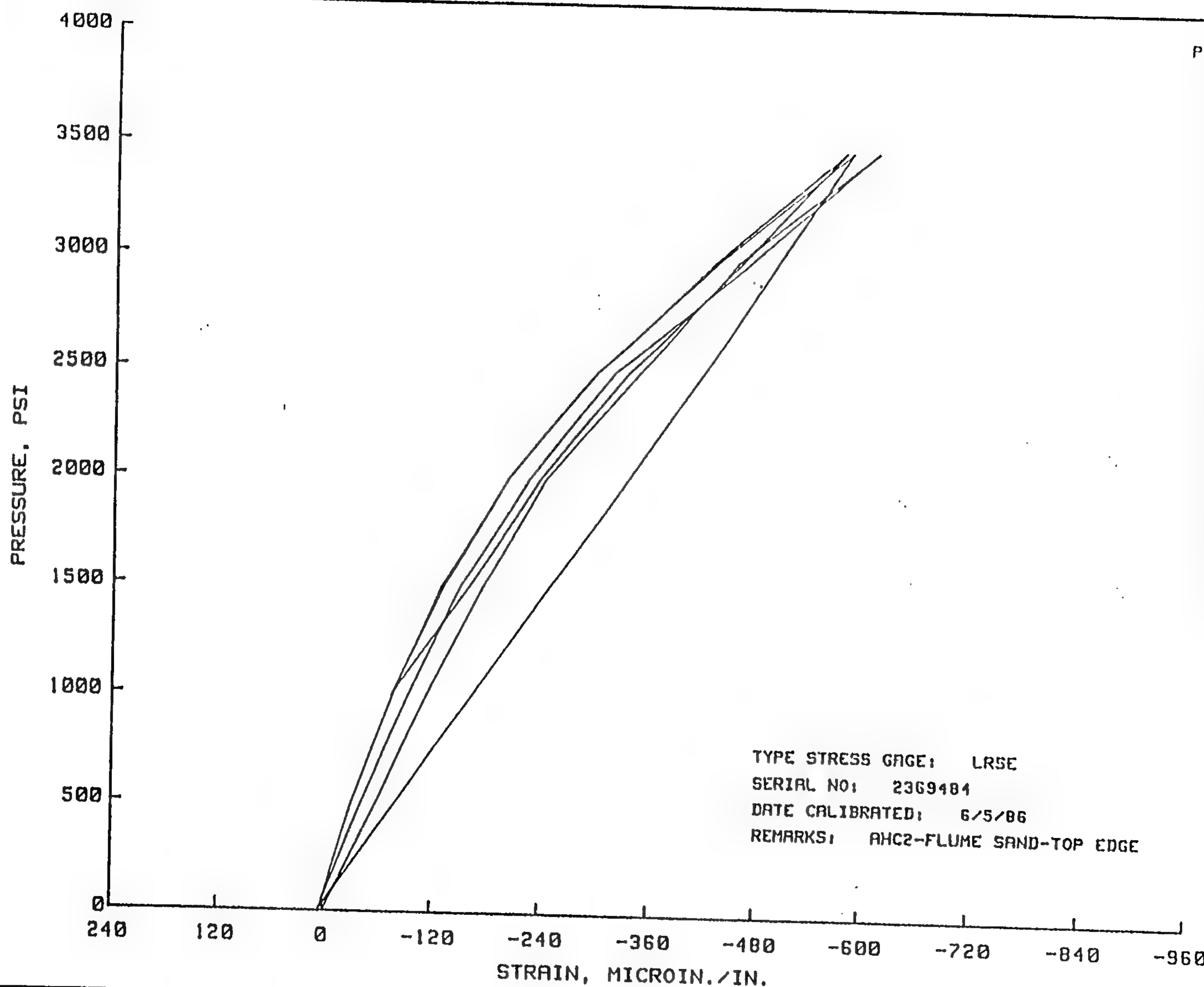
TYPE STRESS GAGE: LRSE

SERIAL NO: 2369484

DATE CALIBRATED: 6/5/86

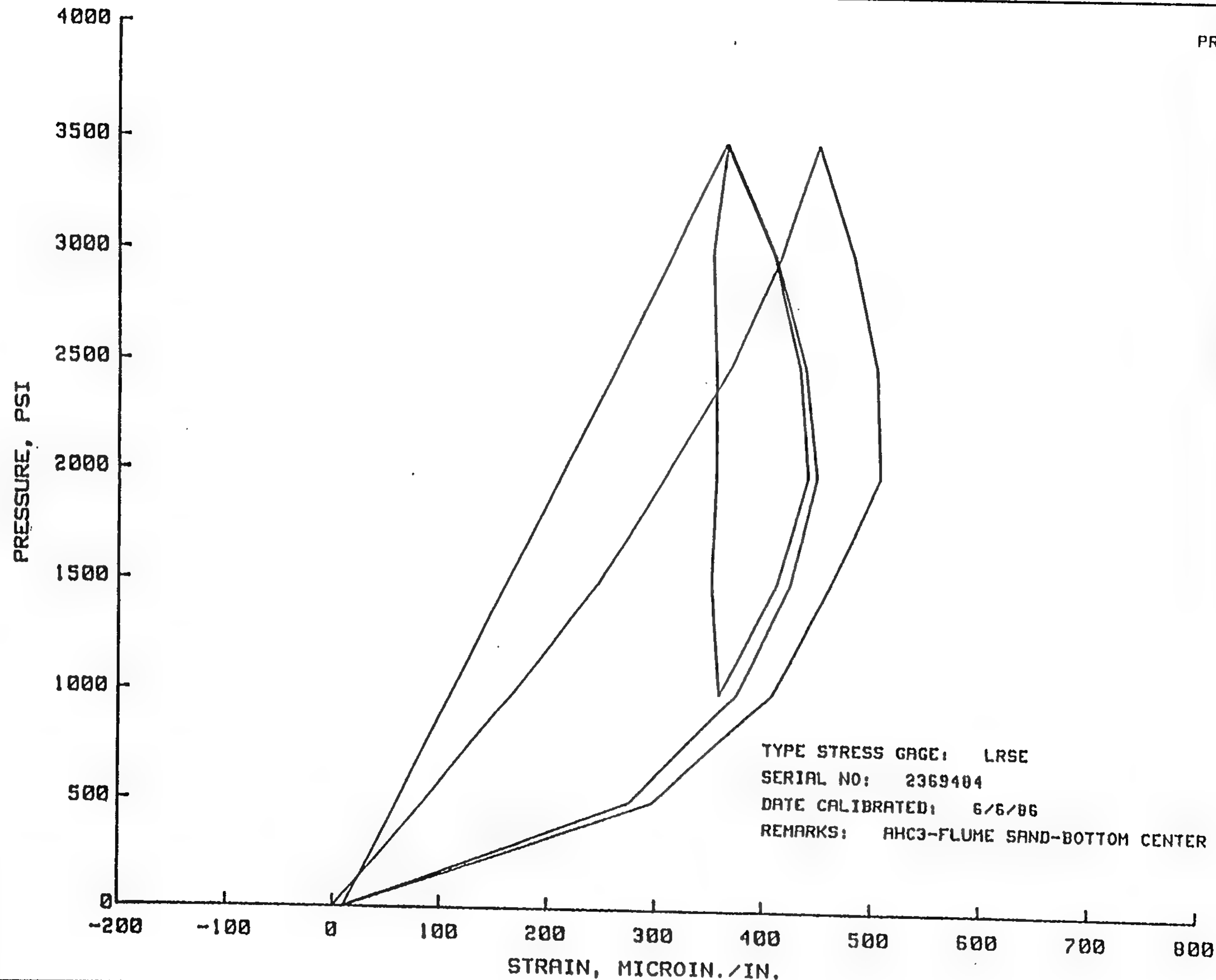
REMARKS: AHC2-FLUME SAND-BOTTOM EDGE

Plate 149

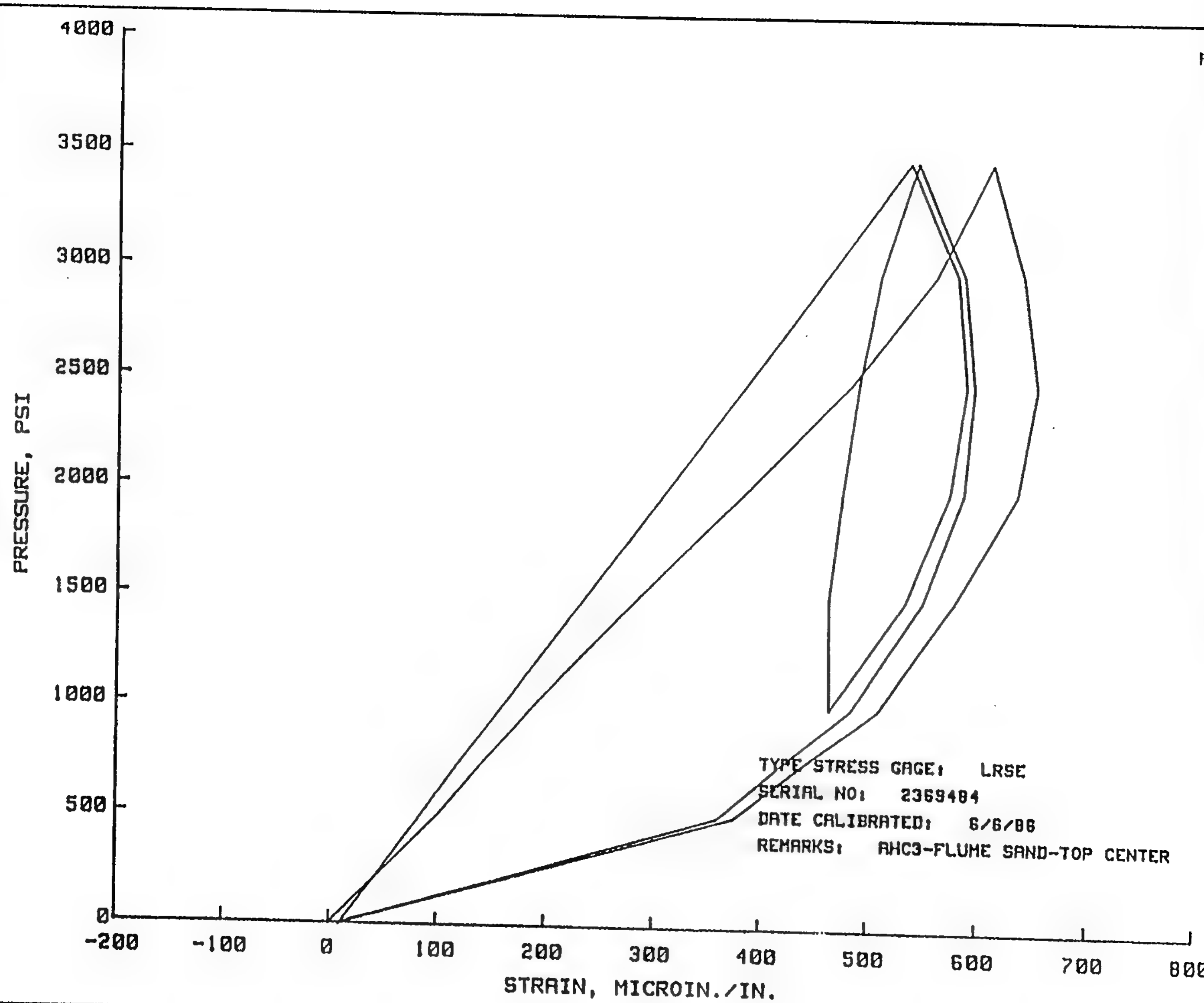


PRESSURE	STRAIN
0	0.0
500	-57.0
1000	-113.5
1500	-175.7
2000	-244.3
2500	-347.4
3000	-450.7
3500	-610.3
3000	-472.6
2500	-319.1
2000	-225.7
1500	-150.0
1000	-92.6
500	-40.9
0	6.1
3500	-589.1
3000	-436.5
2500	-300.0
2000	-202.2
1500	-131.7
1000	-73.9
1500	-160.4
2000	-230.3
2500	-335.2
3000	-463.5
3500	-581.3
3000	-432.2
2500	-300.0
2000	-201.7
1500	-120.7
1000	-75.2
500	-30.0
0	5.2

Plate 150

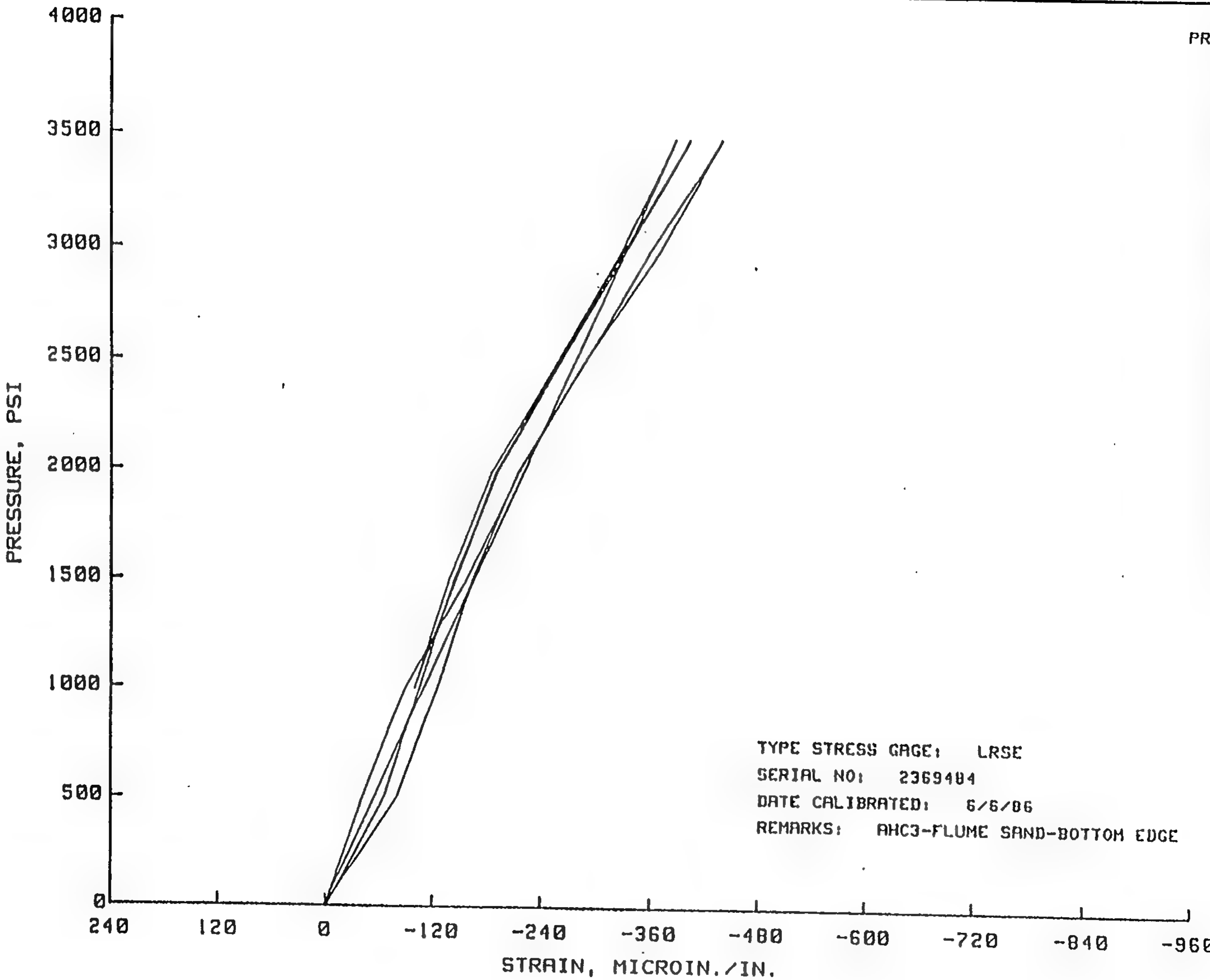


PRESSURE	STRAIN
0	0.0
500	86.1
1000	169.6
1500	247.4
2000	310.4
2500	371.3
3000	417.4
3500	452.6
3000	484.8
2500	505.7
2000	508.7
1500	462.2
1000	408.3
500	296.5
0	9.6
3500	367.0
3000	410.9
2500	434.3
2000	442.2
1500	412.6
1000	359.6
1500	352.6
2000	357.4
2500	356.5
3000	353.9
3500	360.3
3000	412.6
2500	439.6
2000	450.4
1500	425.2
1000	375.7
500	275.2
0	8.3



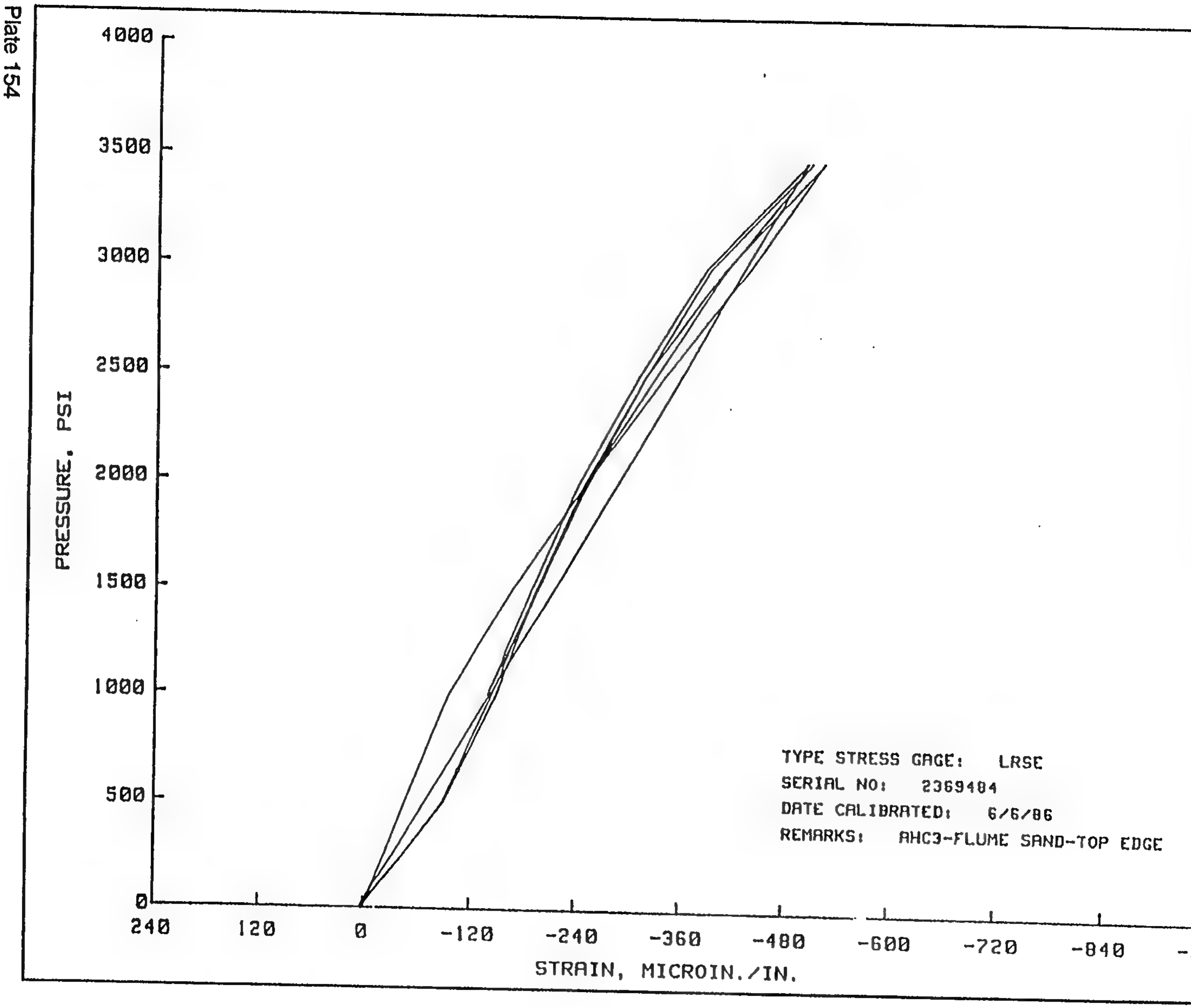
PRESSURE	STRAIN
0	0.0
500	101.7
1000	109.6
1500	204.0
2000	306.9
2500	403.9
3000	562.2
3500	612.2
3000	641.3
2500	653.9
2000	635.7
1500	578.7
1000	509.6
500	375.2
0	10.4
3500	537.8
3000	581.3
2500	589.6
2000	574.3
1500	534.3
1000	463.9
1500	463.5
2000	476.1
2500	490.9
3000	510.9
3500	544.0
3000	587.4
2500	596.5
2000	587.0
1500	550.4
1000	483.9
500	368.4
0	9.1

Plate 152



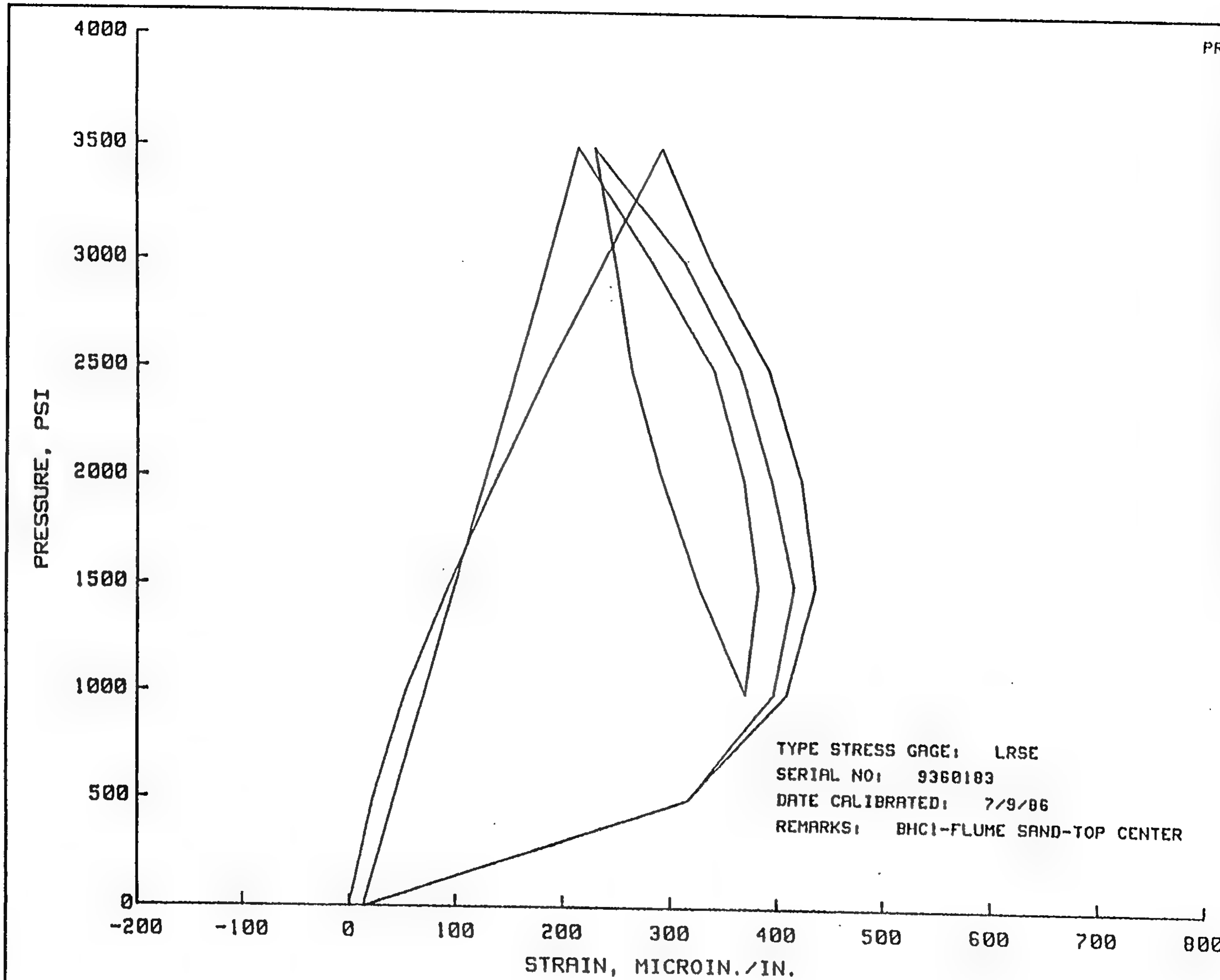
PRESSURE	STRAIN
0	0.0
500	-41.3
1000	-89.6
1500	-157.0
2000	-217.4
2500	-288.7
3000	-372.2
3500	-442.2
3000	-368.9
2500	-288.7
2000	-215.2
1500	-163.9
1000	-125.2
500	-79.1
0	1.7
3500	-390.4
3000	-320.7
2500	-257.0
2000	-186.5
1500	-130.3
1000	-99.6
1500	-146.5
2000	-191.3
2500	-260.4
3000	-331.7
3500	-406.5
3000	-334.3
2500	-262.2
2000	-193.0
1500	-143.9
1000	-105.2
500	-64.8
0	-.9

Plate 153



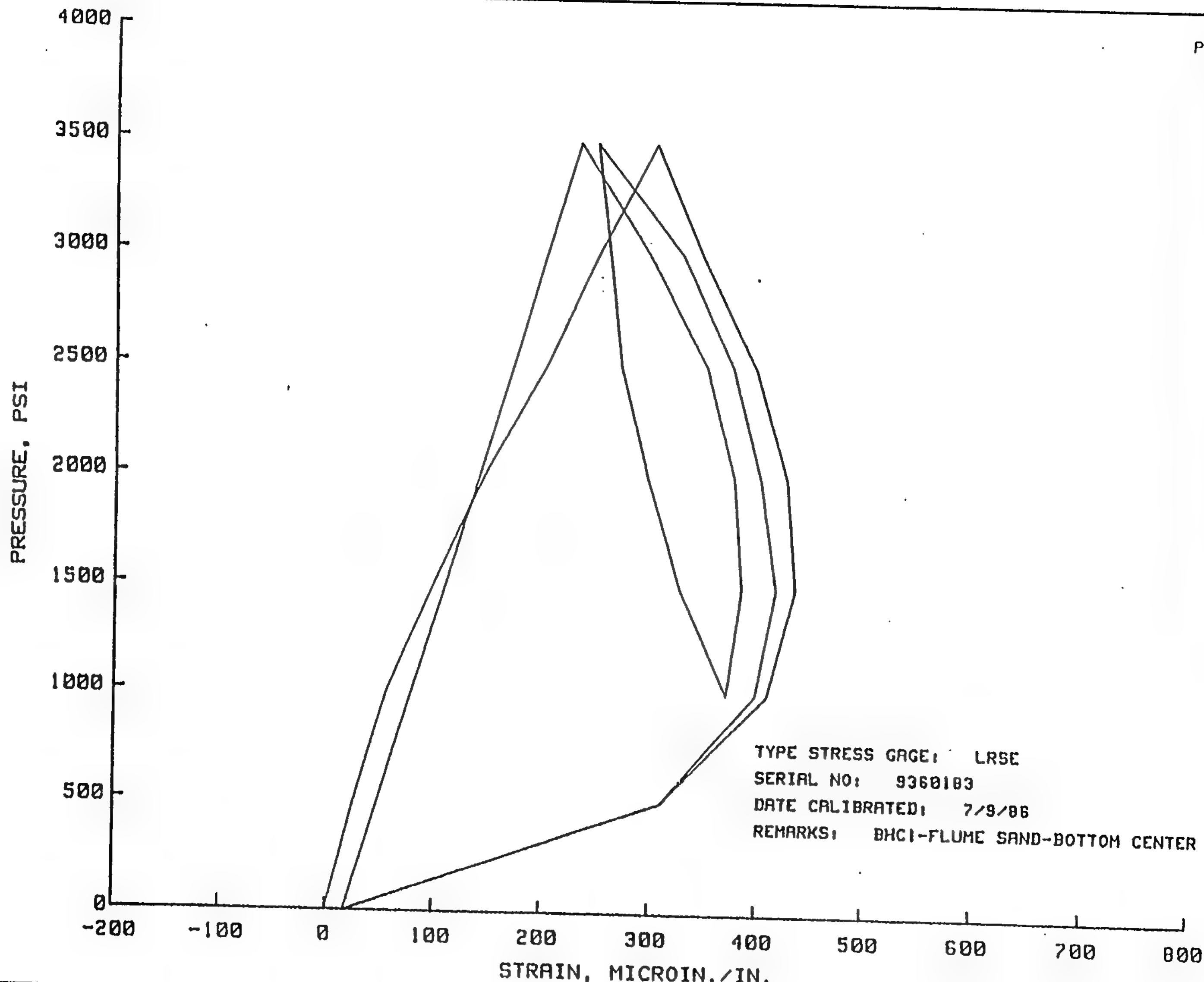
PRESSURE	STRAIN
0	0.0
500	-45.7
1000	-94.3
1500	-165.7
2000	-250.0
2500	-339.1
3000	-430.7
3500	-523.9
3000	-410.0
2500	-316.5
2000	-252.2
1500	-193.5
1000	-147.8
500	-89.6
0	4.0
3500	-504.0
3000	-387.0
2500	-309.1
2000	-241.3
1500	-187.4
1000	-130.3
1500	-195.7
2000	-250.0
2500	-329.1
3000	-412.6
3500	-510.0
3000	-393.0
2500	-317.0
2000	-240.3
1500	-192.6
1000	-143.0
500	-87.4
0	2.2

Plate 154



PRESSURE	STRAIN
0	0.0
500	22.6
1000	53.0
1500	94.0
2000	139.6
2500	187.0
3000	239.1
3500	293.9
3000	339.1
2500	393.0
2000	423.9
1500	437.4
1000	409.1
500	316.1
0	13.0
3500	215.7
3000	283.5
2500	341.3
2000	369.1
1500	383.0
1000	370.0
1500	326.5
2000	291.7
2500	263.5
3000	248.7
3500	230.4
3000	314.3
2500	366.1
2000	395.2
1500	417.0
1000	396.5
500	316.5
0	14.8

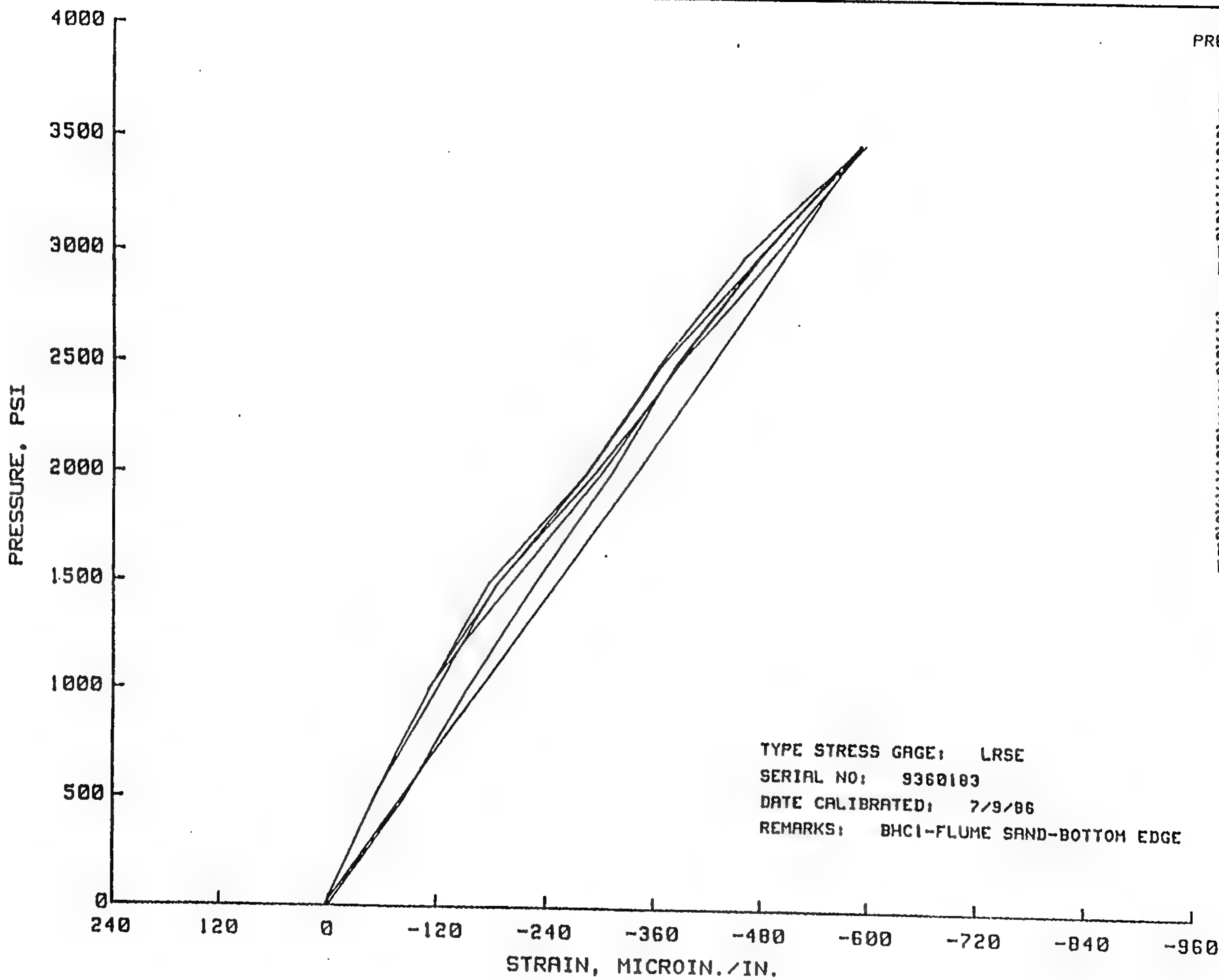
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/9/86
REMARKS: BHCI-FLUME SAND-TOP CENTER



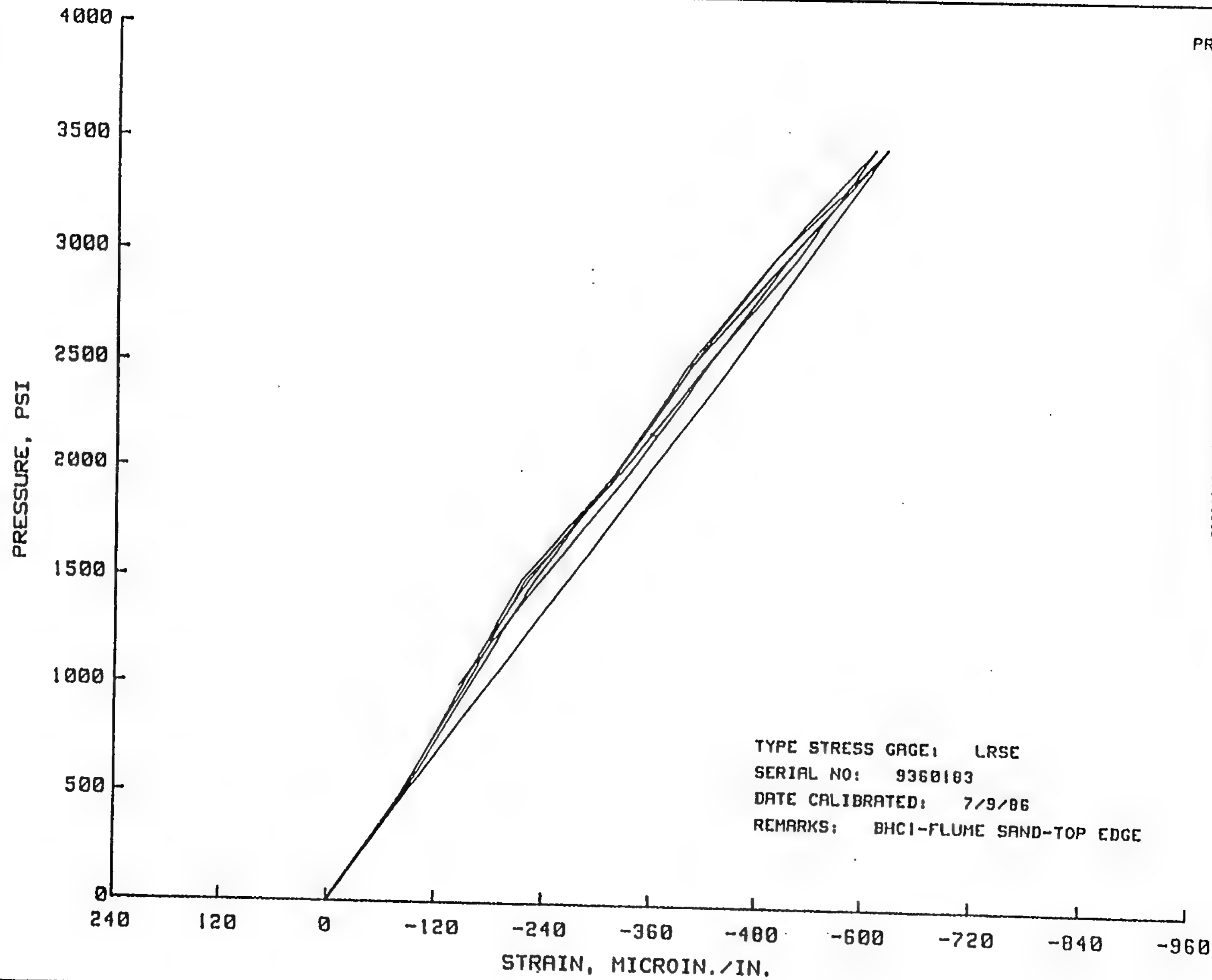
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/9/86
REMARKS: BHCI-FLUME SAND-BOTTOM CENTER

PRESSURE	STRAIN
0	0.0
500	26.1
1000	55.7
1500	90.7
2000	145.7
2500	203.0
3000	251.3
3500	303.9
3000	347.4
2500	398.3
2000	428.3
1500	436.5
1000	409.6
500	310.4
0	17.0
3500	234.3
3000	297.8
2500	352.2
2000	370.3
1500	385.7
1000	371.3
1500	326.5
2000	296.1
2500	271.3
3000	260.9
3500	249.1
3000	329.1
2500	377.0
2000	403.0
1500	418.3
1000	398.3
500	310.2
0	18.3

Plate 156



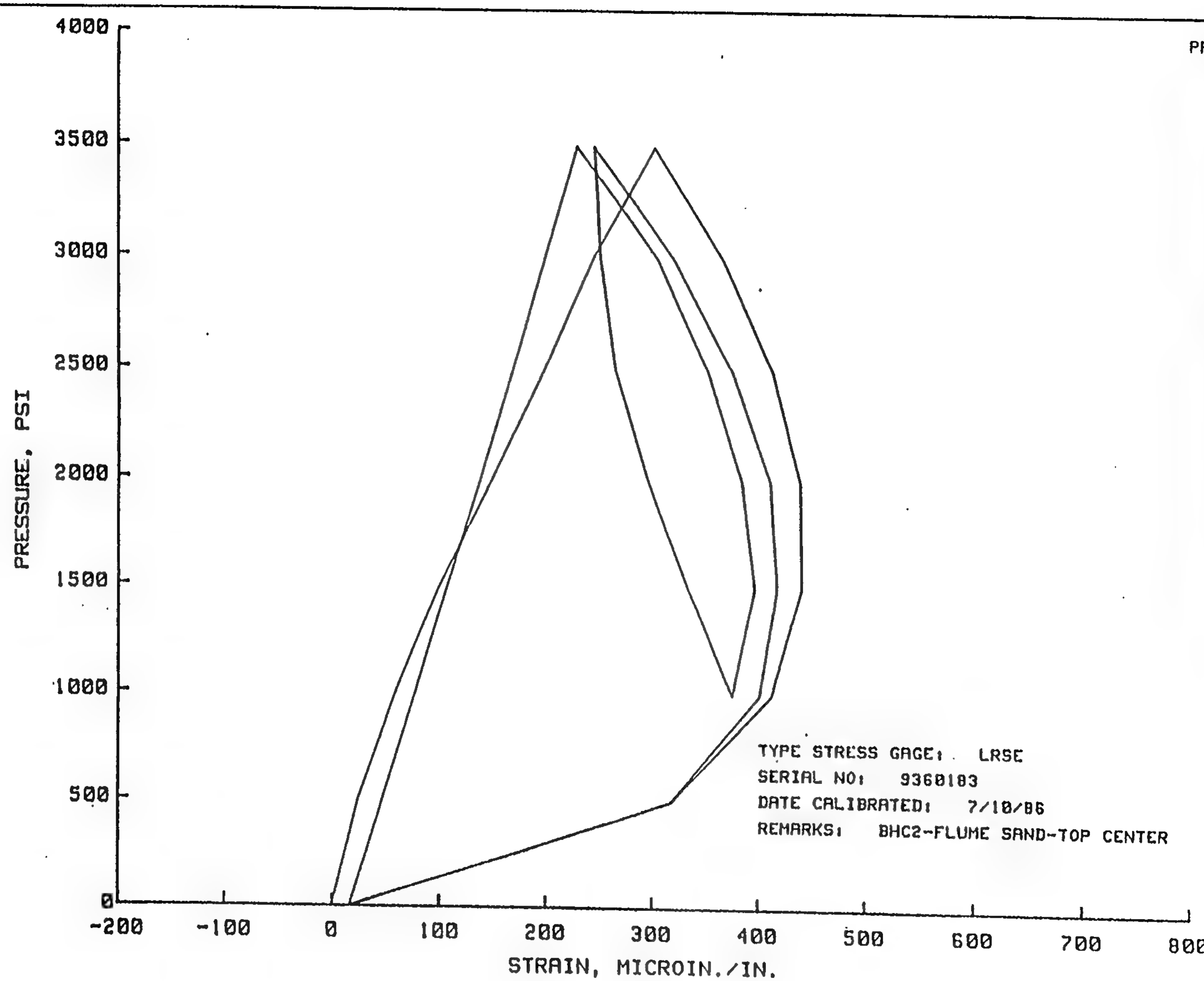
PRESSURE	STRAIN
0	0.0
500	-84.8
1000	-153.0
1500	-228.3
2000	-310.4
2500	-382.6
3000	-478.3
3500	-600.0
3000	-493.5
2500	-385.7
2000	-291.3
1500	-186.5
1000	-119.1
500	-50.9
0	4.3
3500	-593.5
3000	-477.8
2500	-366.5
2000	-283.0
1500	-187.4
1000	-109.6
1500	-202.6
2000	-299.1
2500	-384.3
3000	-480.4
3500	-596.1
3000	-462.6
2500	-363.5
2000	-282.2
1500	-177.4
1000	-111.3
500	-50.4
0	3.9



TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/9/86
REMARKS: BHCI-FLUME SAND-TOP EDGE

PRESSURE	STRAIN
0	0.0
500	-86.5
1000	-150.3
1500	-230.4
2000	-319.6
2500	-397.8
3000	-499.1
3500	-612.6
3000	-523.9
2500	-417.4
2000	-325.2
1500	-219.1
1000	-153.9
500	-81.7
0	1.7
3500	-626.1
3000	-512.2
2500	-402.2
2000	-320.4
1500	-223.5
1000	-145.7
1500	-237.4
2000	-335.7
2500	-420.4
3000	-514.3
3500	-626.1
3000	-499.1
2500	-401.3
2000	-320.9
1500	-215.2
1000	-149.6
500	-83.9
0	0.0

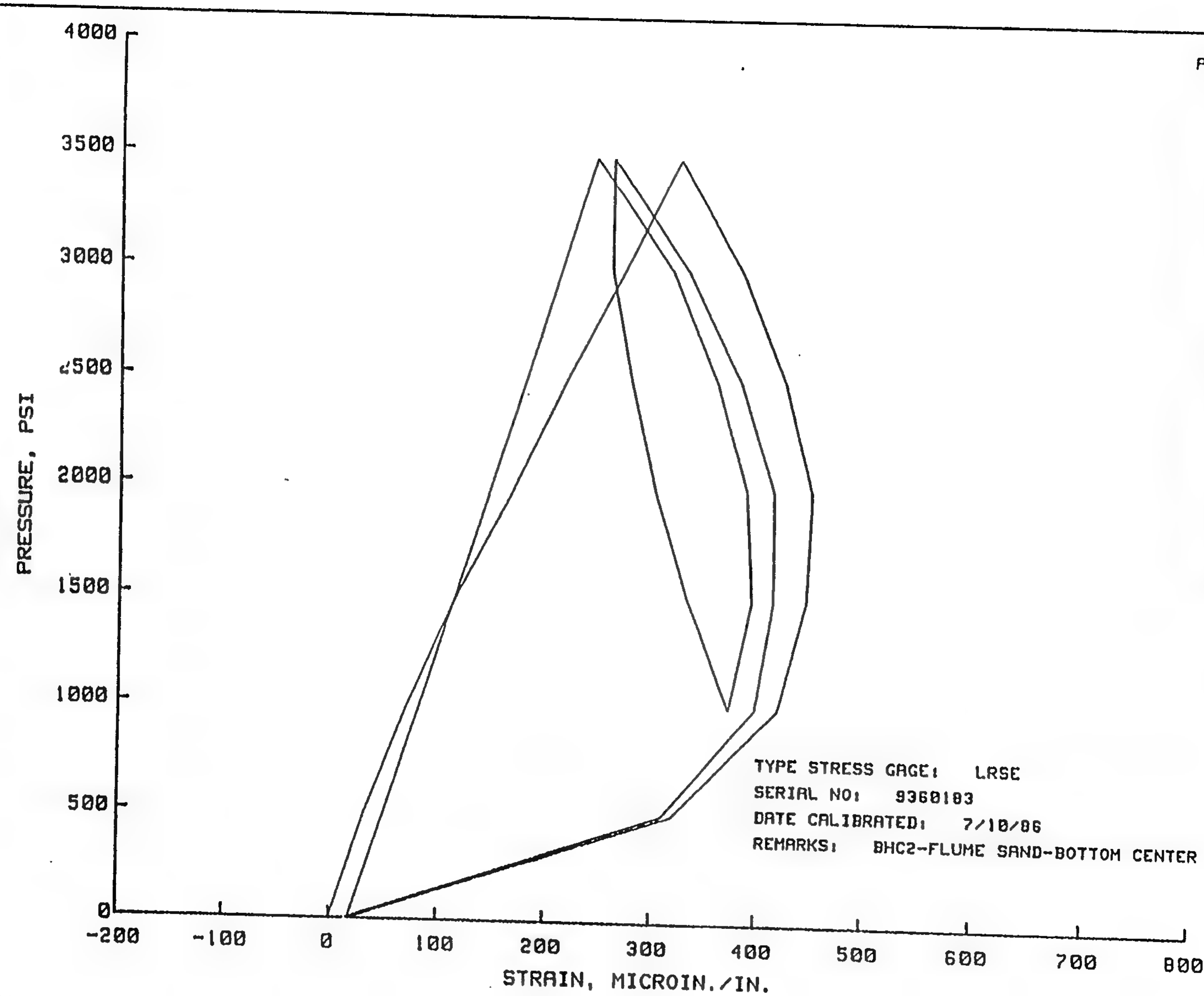
Plate 158



TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/10/86
REMARKS: BHC2-FLUME SAND-TOP CENTER

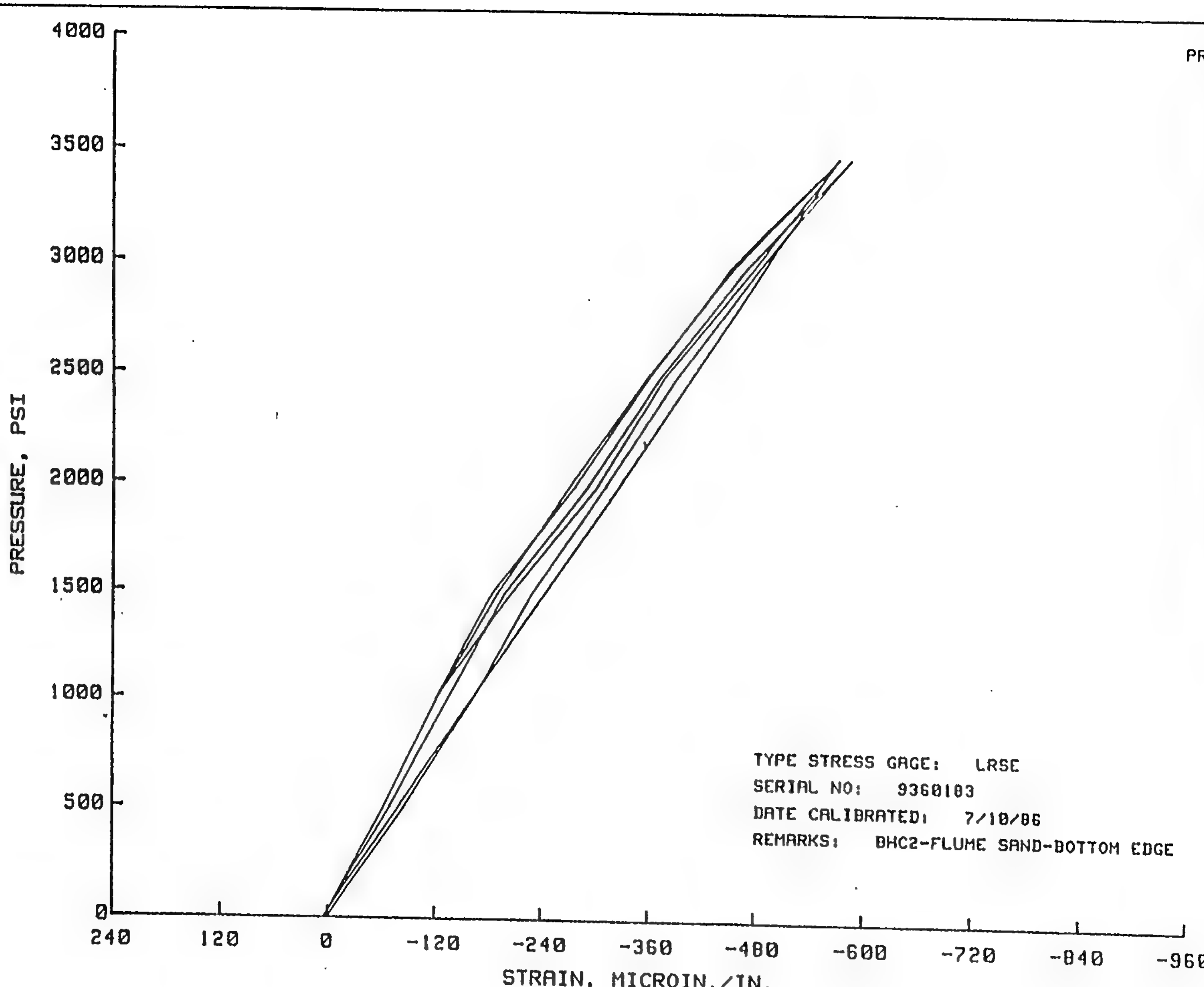
PRESSURE	STRAIN
0	0.0
500	24.3
1000	50.7
1500	100.4
2000	149.1
2500	190.3
3000	244.0
3500	303.0
3000	367.0
2500	414.3
2000	440.0
1500	441.3
1000	412.2
500	310.3
0	16.1
3500	229.6
3000	305.7
2500	353.0
2000	384.0
1500	397.0
1000	375.2
1500	333.5
2000	295.7
2500	264.0
3000	250.9
3500	245.2
3000	321.3
2500	376.1
2000	411.7
1500	410.3
1000	400.9
500	317.4
0	14.3

Plate 159



PRESSURE	STRAIN
0	0.0
500	32.2
1000	70.9
1500	115.7
2000	169.1
2500	217.0
3000	271.7
3500	324.0
3000	385.2
2500	426.5
2000	451.7
1500	446.5
1000	420.0
500	319.6
0	17.4
3500	244.0
3000	317.0
2500	360.9
2000	389.6
1500	395.2
1000	373.5
1500	333.0
2000	300.9
2500	277.0
3000	259.1
3500	260.4
3000	333.0
2500	383.9
2000	415.7
1500	415.7
1000	398.3
500	310.0
0	13.0

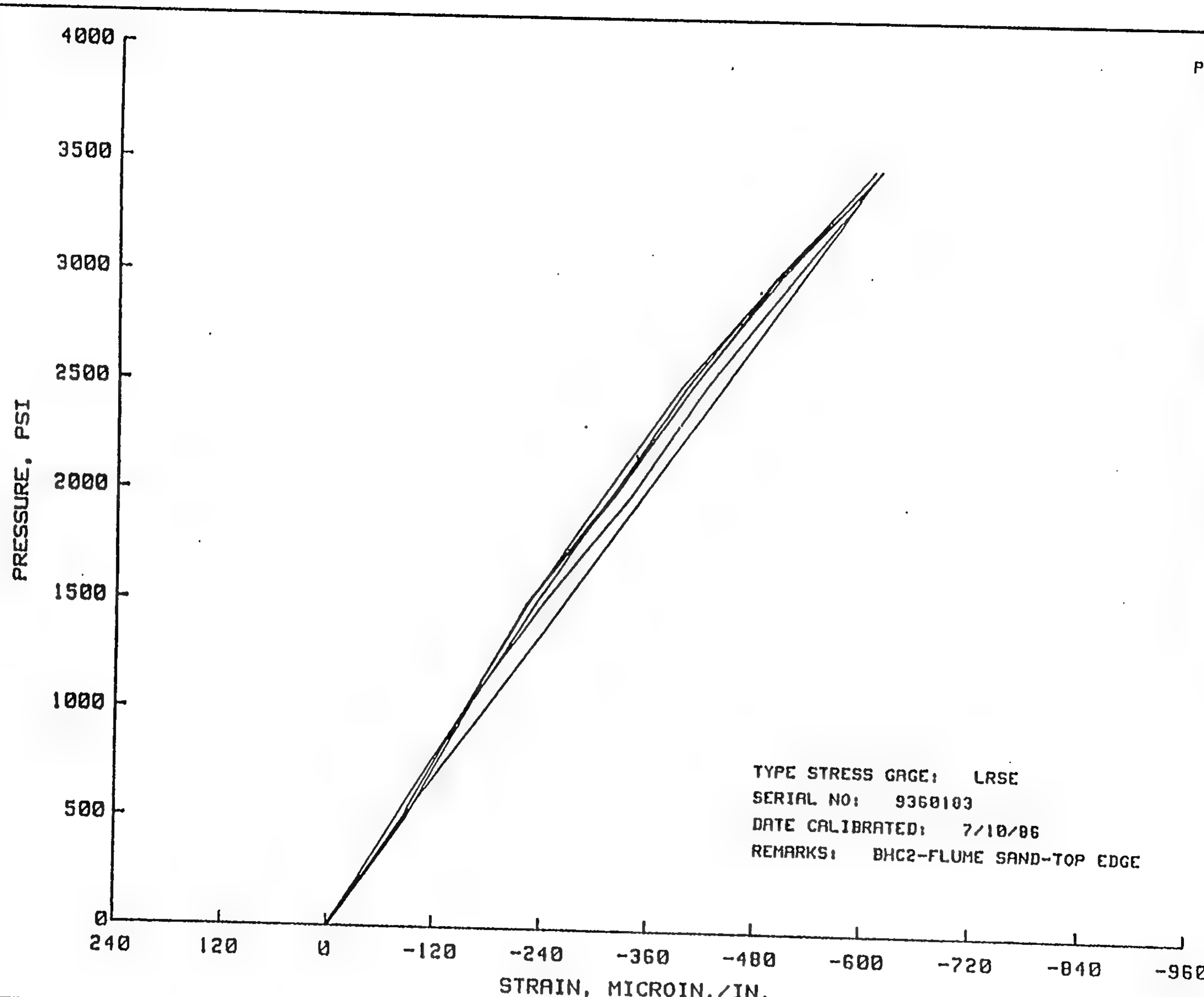
Plate 160



PRESSURE	STRAIN
0	0.0
500	-84.3
1000	-163.0
1500	-230.0
2000	-312.2
2500	-393.0
3000	-487.4
3500	-590.0
3000	-472.6
2500	-373.5
2000	-292.2
1500	-198.7
1000	-133.9
500	-67.8
0	4.8
3500	-576.1
3000	-454.3
2500	-360.9
2000	-277.4
1500	-184.3
1000	-120.0
1500	-206.5
2000	-303.0
2500	-378.7
3000	-481.3
3500	-576.5
3000	-458.3
2500	-358.7
2000	-271.7
1500	-190.4
1000	-121.3
500	-61.3
0	3.9

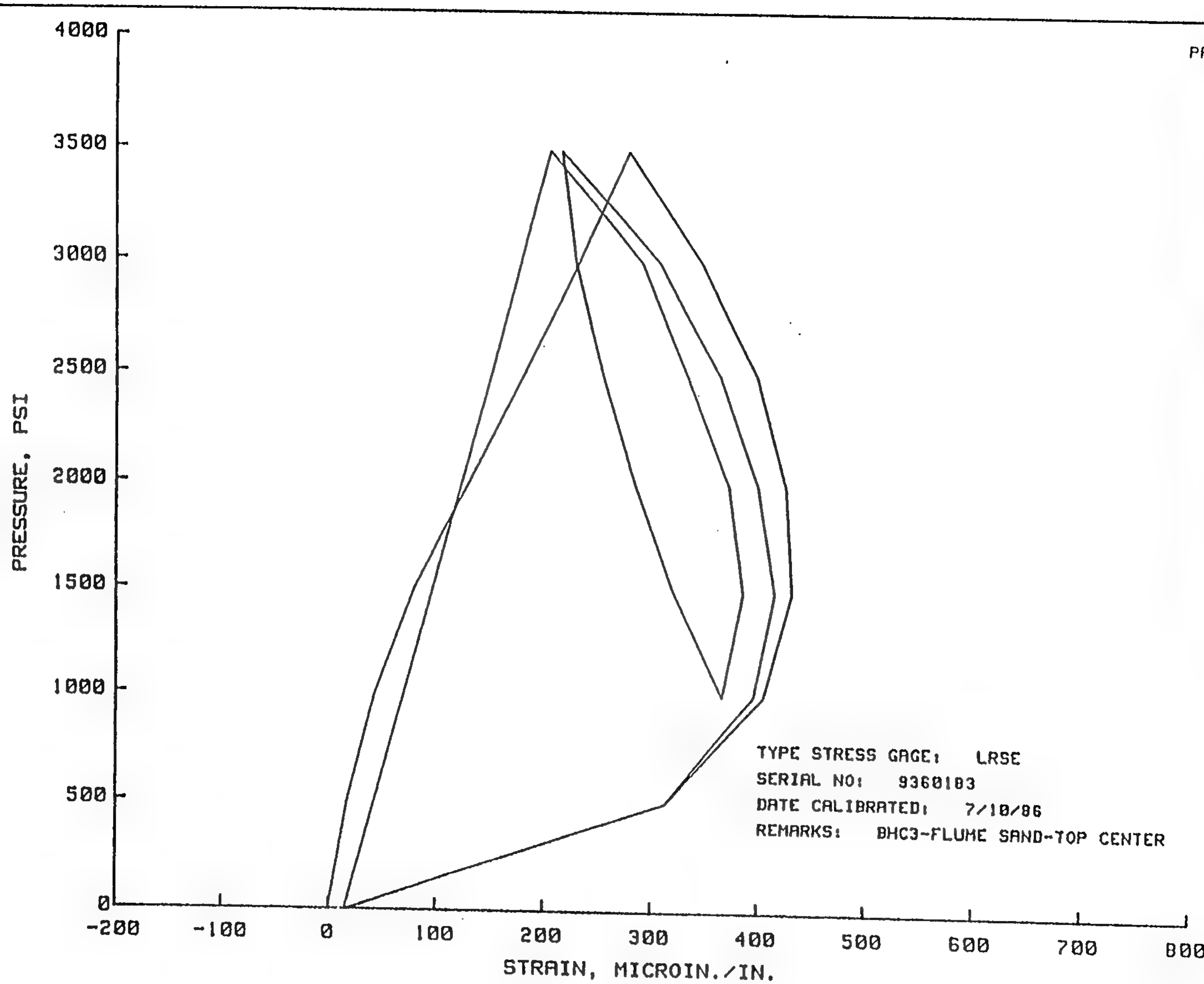
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 7/10/86
REMARKS: BHC2-FLUME SAND-BOTTOM EDGE

Plate 161



PRESSURE	STRAIN
0	0.0
500	-77.4
1000	-153.5
1500	-224.3
2000	-308.3
2500	-393.5
3000	-499.1
3500	-611.3
3000	-497.0
2500	-399.1
2000	-317.0
1500	-221.3
1000	-153.0
500	-84.8
0	1.3
3500	-617.0
3000	-499.1
2500	-405.7
2000	-320.4
1500	-222.6
1000	-153.0
1500	-240.4
2000	-339.1
2500	-421.7
3000	-519.6
3500	-619.1
3000	-503.5
2500	-405.7
2000	-317.4
1500	-231.7
1000	-156.1
500	-89.6
0	-1.3

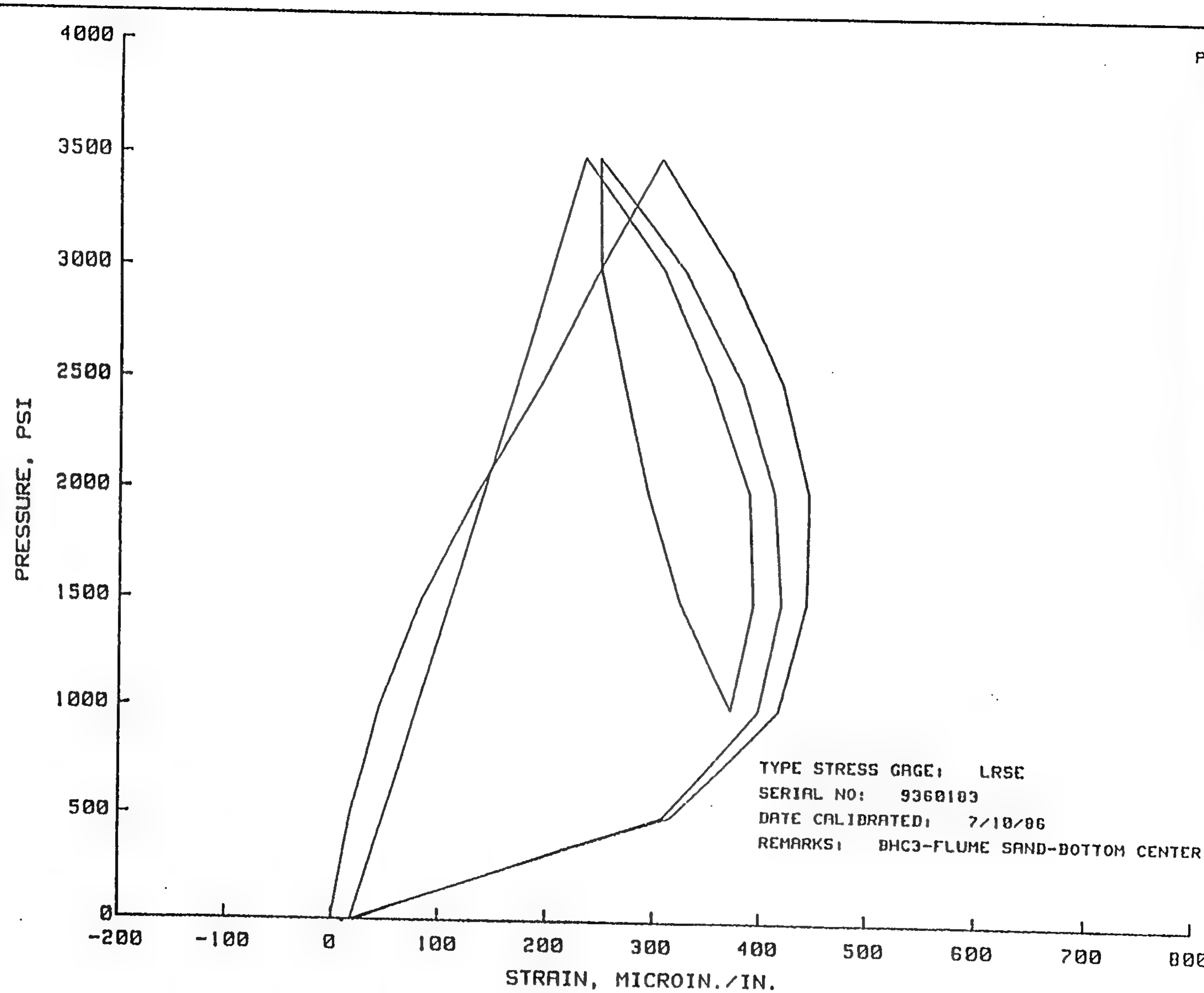
Plate 162



TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 7/10/86
REMARKS: BHC3-FLUME SAND-TOP CENTER

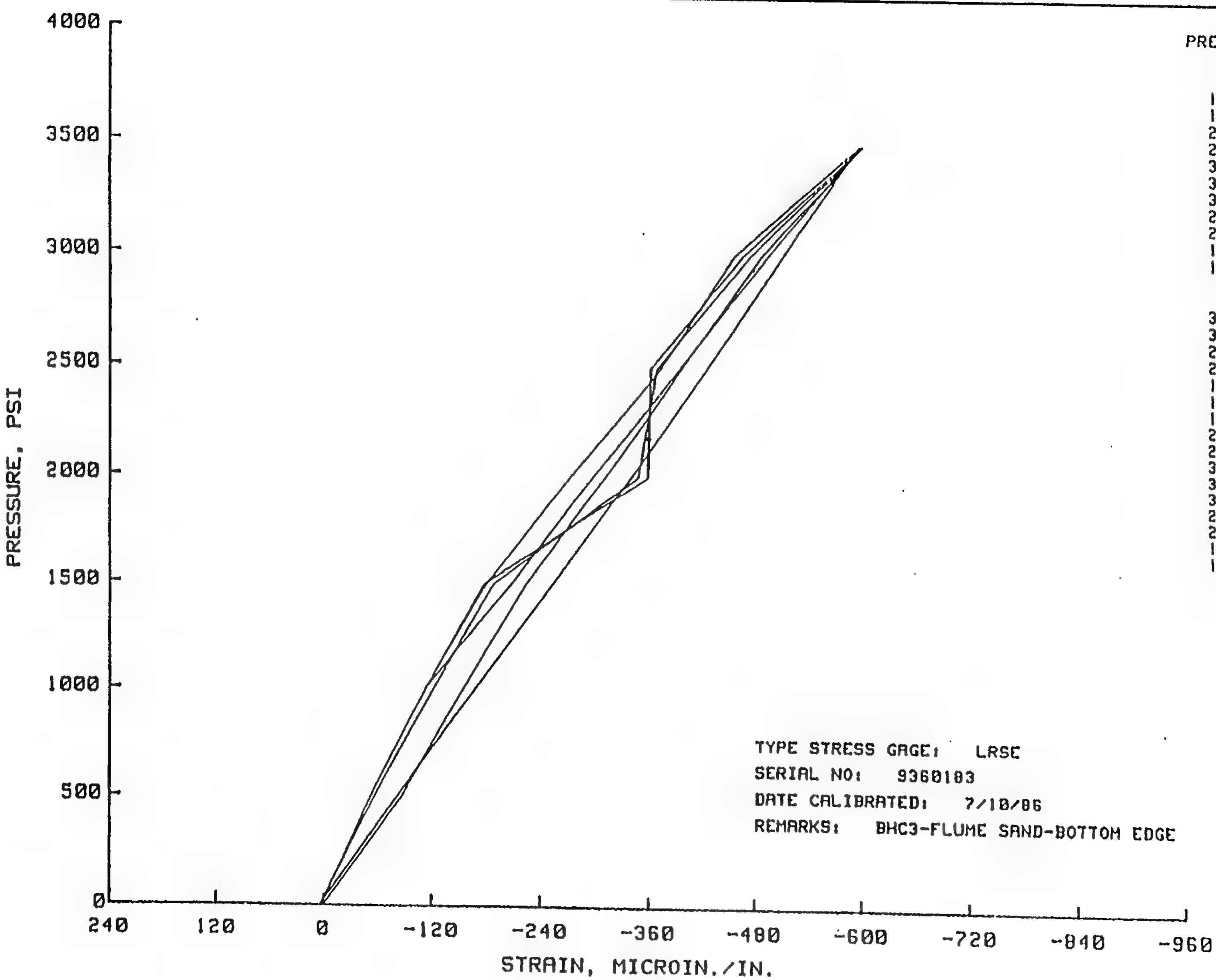
PRESSURE	STRAIN
0	0.0
500	17.4
1000	42.6
1500	79.6
2000	130.9
2500	102.2
3000	233.0
3500	200.0
3000	349.1
2500	400.0
2000	427.0
1500	432.6
1000	405.2
500	313.5
0	14.0
3500	207.0
3000	292.2
2500	334.0
2000	373.9
1500	387.0
1000	367.0
1500	320.9
2000	284.0
2500	254.3
3000	229.6
3500	217.0
3000	309.1
2500	365.7
2000	400.9
1500	416.5
1000	395.7
500	312.6
0	17.0

Plate 163



PRESSURE	STRAIN
0	0.0
500	17.4
1000	44.3
1500	83.5
2000	136.5
2500	196.1
3000	248.3
3500	306.5
3000	372.2
2500	420.4
2000	445.7
1500	443.5
1000	417.0
500	316.1
0	17.8
3500	234.8
3000	308.7
2500	353.9
2000	389.6
1500	393.5
1000	372.2
1500	324.3
2000	293.0
2500	270.0
3000	248.7
3500	247.8
3000	328.7
2500	382.2
2000	413.5
1500	420.0
1000	397.0
500	308.7
0	21.3

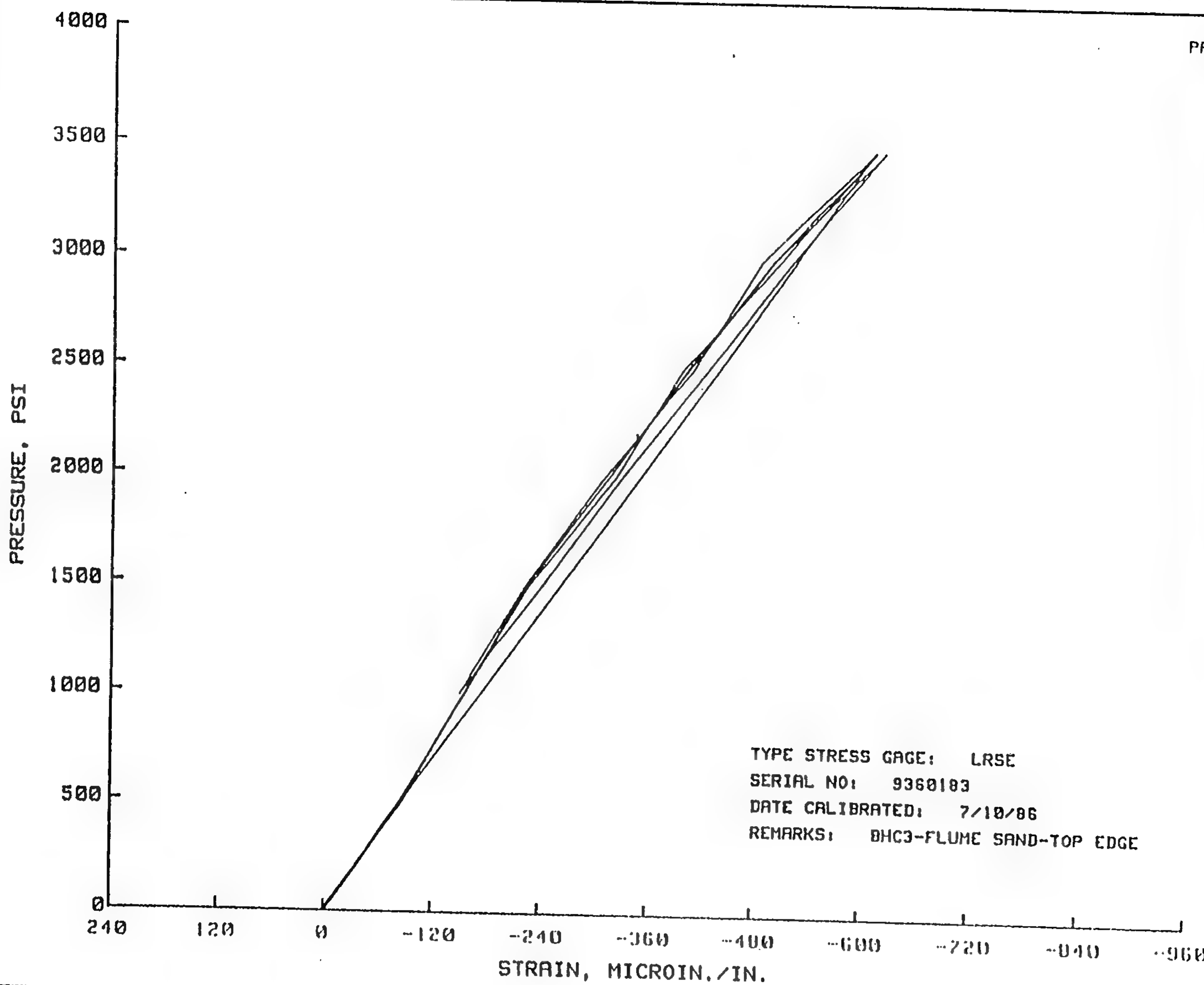
Plate 164



PRESSURE	STRAIN
0	0.0
500	-87.0
1000	-154.0
1500	-234.0
2000	-311.7
2500	-397.4
3000	-487.0
3500	-602.6
3000	-474.0
2500	-360.7
2000	-347.4
1500	-180.7
1000	-121.3
500	-56.1
0	4.3
3500	-598.3
3000	-457.0
2500	-373.0
2000	-273.0
1500	-180.9
1000	-112.2
1500	-208.7
2000	-290.3
2500	-394.8
3000	-495.2
3500	-601.3
3000	-466.5
2500	-361.7
2000	-358.3
1500	-178.3
1000	-112.6
500	-52.2
0	3.0

TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/10/86
REMARKS: BHC3-FLUME SAND-BOTTOM EDGE

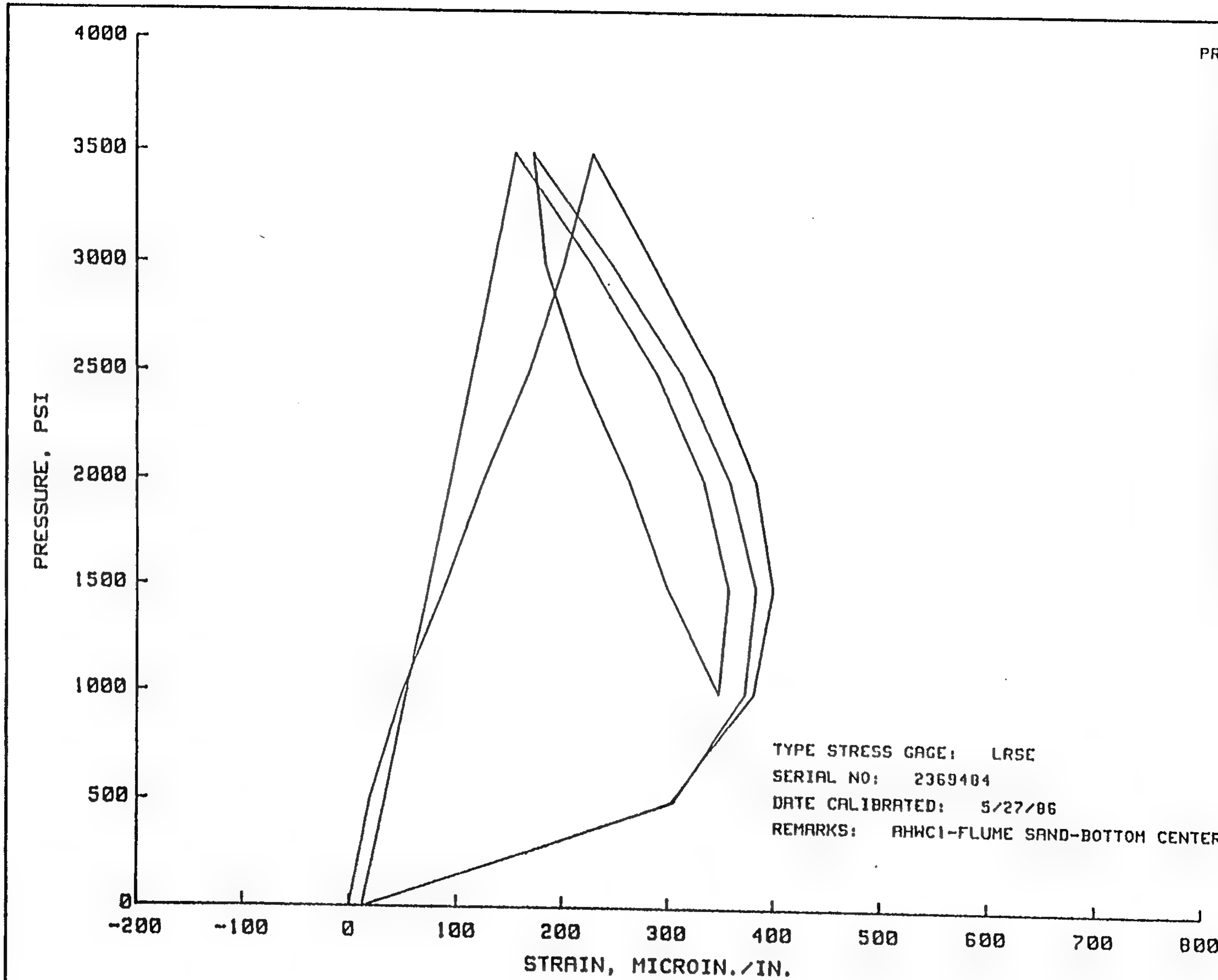
Plate 165



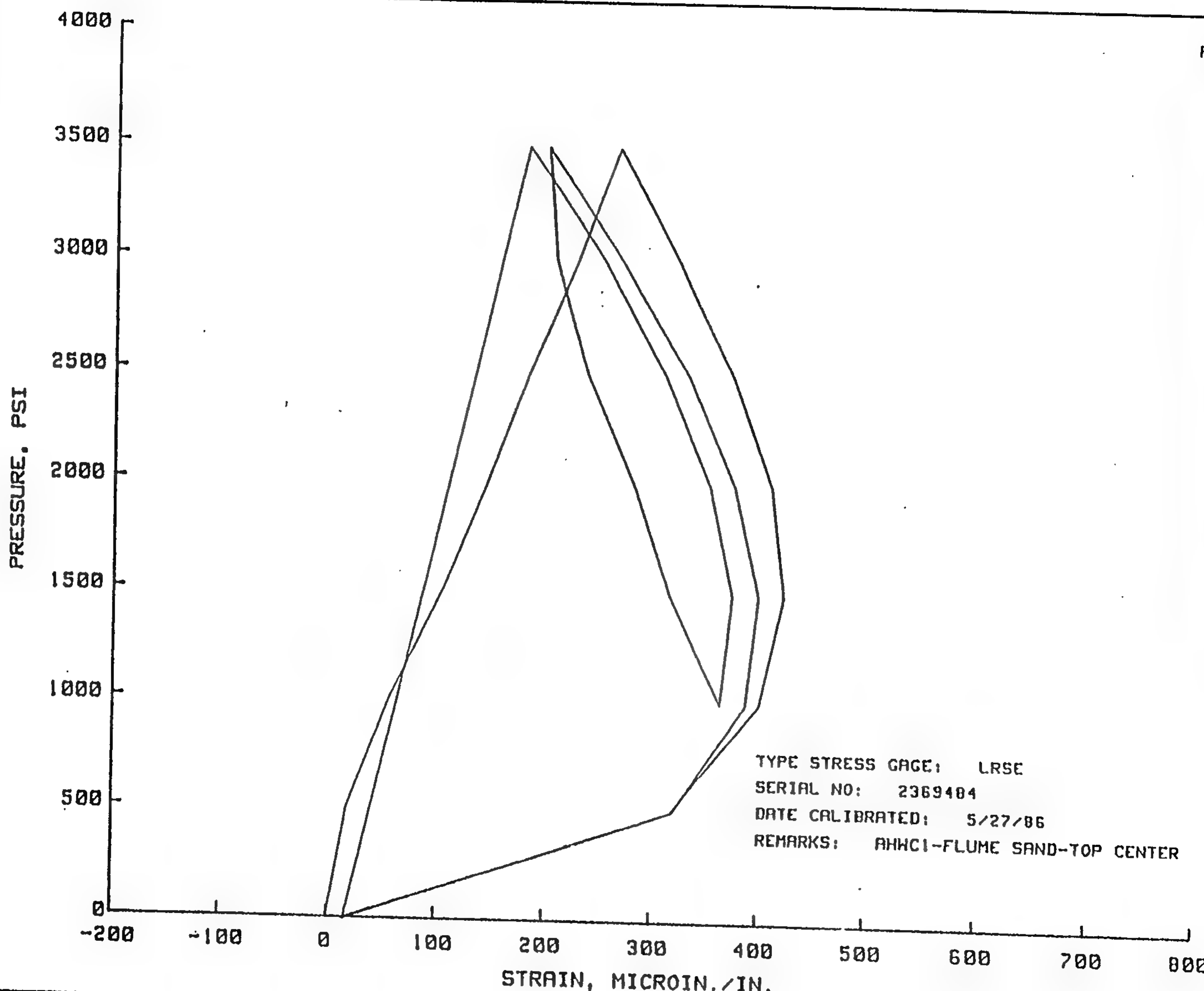
PRESSURE	STRAIN
0	0.0
500	-84.3
1000	-157.4
1500	-220.3
2000	-323.9
2500	-390.7
3000	-510.0
3500	-618.7
3000	-501.3
2500	-402.6
2000	-316.1
1500	-224.0
1000	-154.0
500	-85.7
0	2.6
3500	-617.0
3000	-488.7
2500	-410.0
2000	-310.9
1500	-222.6
1000	-150.4
1500	-242.6
2000	-330.9
2500	-427.4
3000	-523.9
3500	-620.7
3000	-502.2
2500	-405.2
2000	-315.2
1500	-224.3
1000	-155.7
500	-87.4
0	0.0

TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 7/10/86
REMARKS: BHC3-FLUME SAND-TOP EDGE

Plate 166



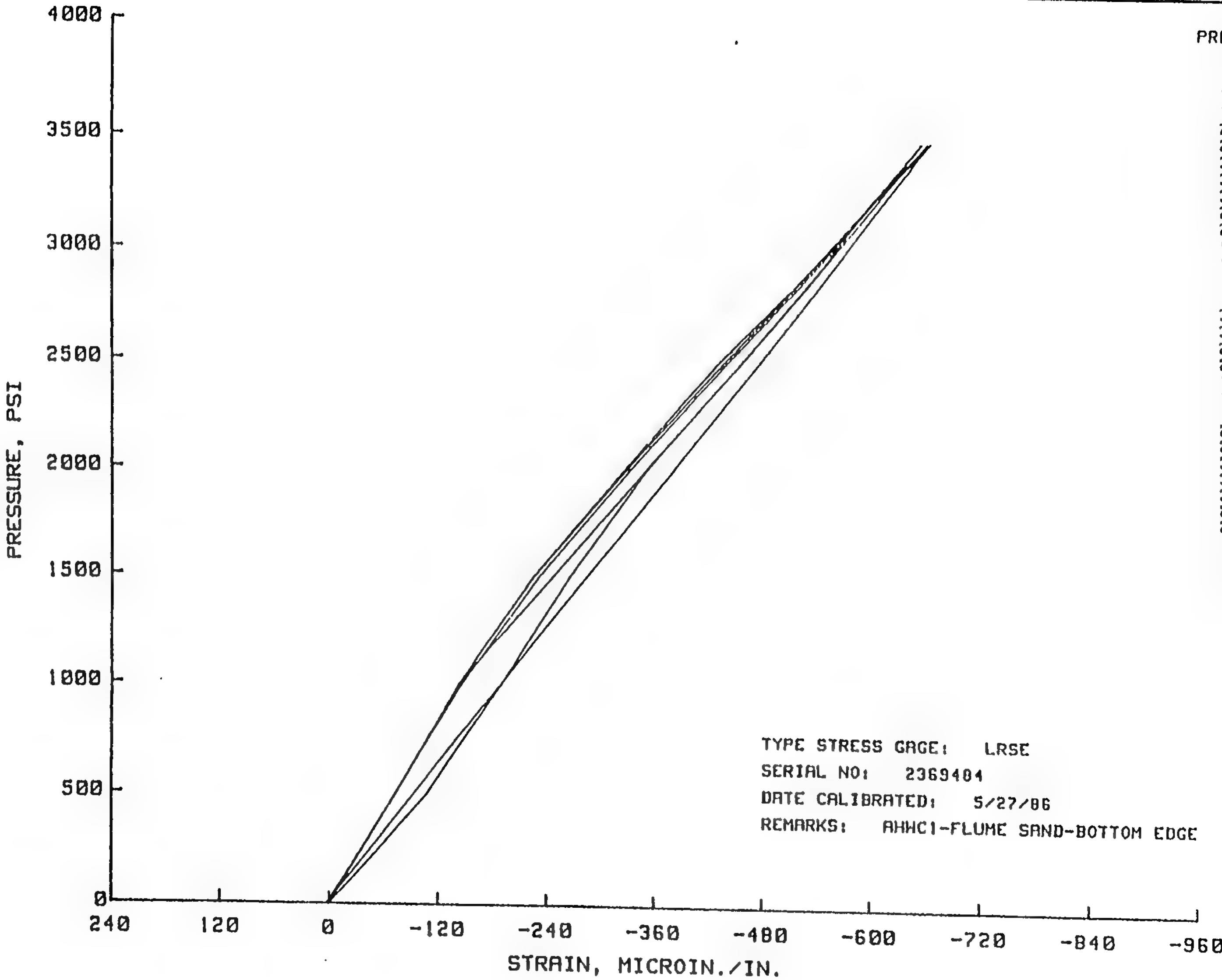
PRESSURE	STRAIN
0	0.0
500	10.7
1000	49.6
1500	89.6
2000	126.1
2500	160.7
3000	202.2
3500	230.4
3000	207.4
2500	343.0
2000	304.3
1500	400.0
1000	380.9
500	302.6
0	11.7
3500	157.0
3000	228.7
2500	290.0
2000	335.2
1500	358.3
1000	348.3
1500	299.1
2000	263.8
2500	217.4
3000	183.9
3500	173.0
3000	248.3
2500	313.9
2000	360.0
1500	383.9
1000	372.6
500	385.2
0	11.7



PRESSURE	STRAIN
0	0.0
500	17.0
1000	56.1
1500	104.8
2000	146.1
2500	183.9
3000	228.3
3500	266.5
3000	323.5
2500	375.2
2000	412.2
1500	424.3
1000	400.9
500	318.7
0	16.1
3500	182.2
3000	253.0
2500	311.3
2000	354.3
1500	375.7
1000	364.3
1500	316.1
2000	281.7
2500	237.4
3000	207.4
3500	199.1
3000	269.6
2500	333.5
2000	377.4
1500	400.4
1000	388.3
500	320.4
0	16.5

TYPE STRESS GAGE: LRSE
SERIAL NO: 2369484
DATE CALIBRATED: 5/27/86
REMARKS: AHHCI-FLUME SAND-TOP CENTER

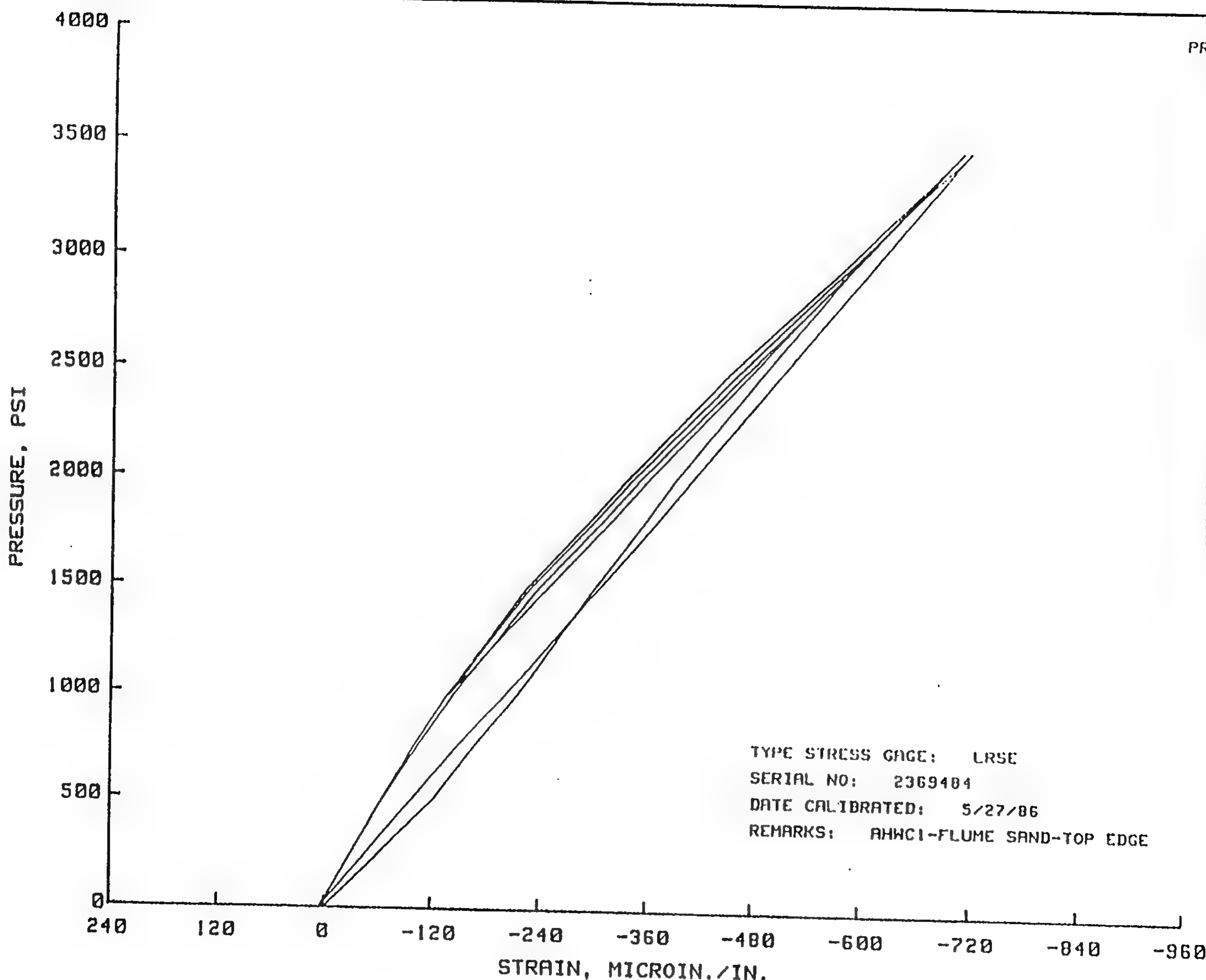
Plate 168



TYPE STRESS GAGE: LRSE
SERIAL NO: 2369404
DATE CALIBRATED: 5/27/86
REMARKS: AHHC1-FLUME SAND-BOTTOM EDGE

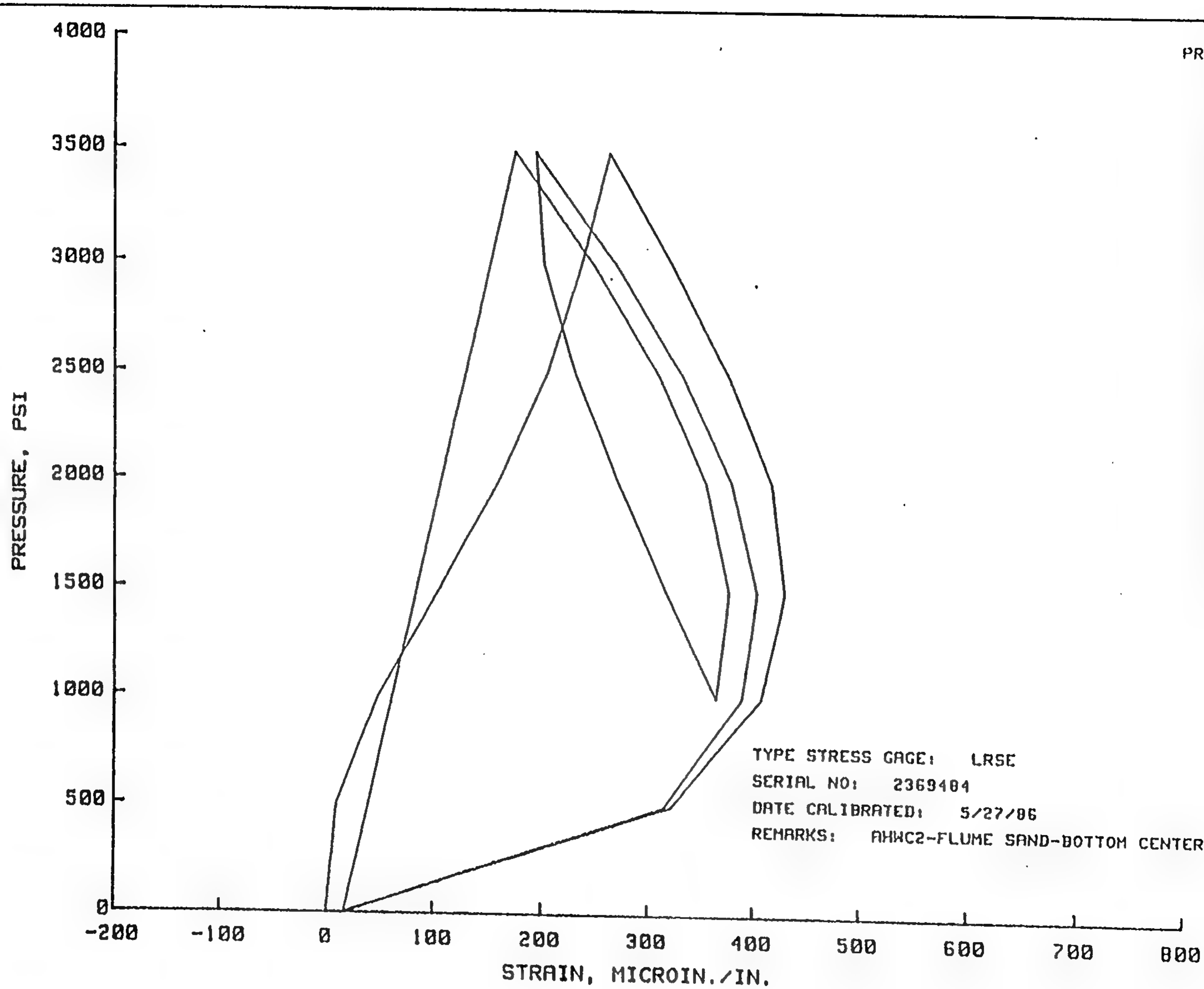
PRESSURE	STRAIN
0	0.0
500	-107.4
1000	-189.6
1500	-266.1
2000	-350.9
2500	-456.5
3000	-550.7
3500	-650.7
3000	-554.3
2500	-440.4
2000	-331.3
1500	-231.3
1000	-145.7
500	-71.7
0	3.5
3500	-660.3
3000	-550.9
2500	-436.1
2000	-327.0
1500	-225.7
1000	-141.7
1500	-247.4
2000	-349.6
2500	-456.5
3000	-562.2
3500	-664.0
3000	-550.0
2500	-430.4
2000	-324.3
1500	-224.0
1000	-142.2
500	-72.2
0	1.3

Plate 169



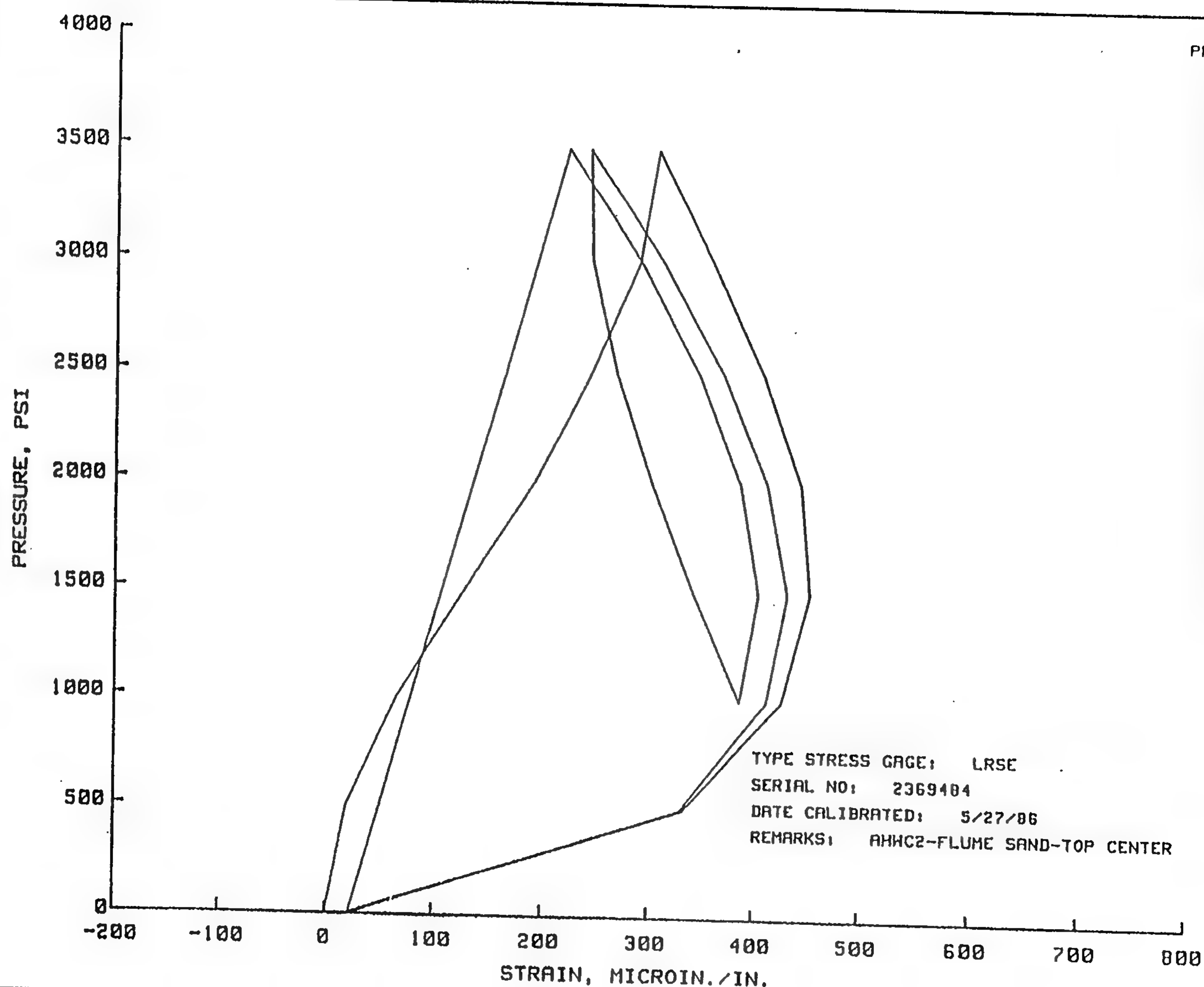
PRESSURE	STRAIN
0	0.0
500	-122.2
1000	-215.2
1500	-300.0
2000	-390.0
2500	-490.9
3000	-595.2
3500	-711.3
3000	-596.1
2500	-470.0
2000	-340.7
1500	-230.3
1000	-143.9
500	-65.2
0	5.7
3500	-719.1
3000	-590.0
2500	-462.2
2000	-340.0
1500	-229.1
1000	-130.7
1500	-240.7
2000	-350.7
2500	-477.0
3000	-593.5
3500	-710.9
3000	-585.2
2500	-452.2
2000	-333.9
1500	-225.2
1000	-137.0
500	-63.9
0	4.8

Plate 170



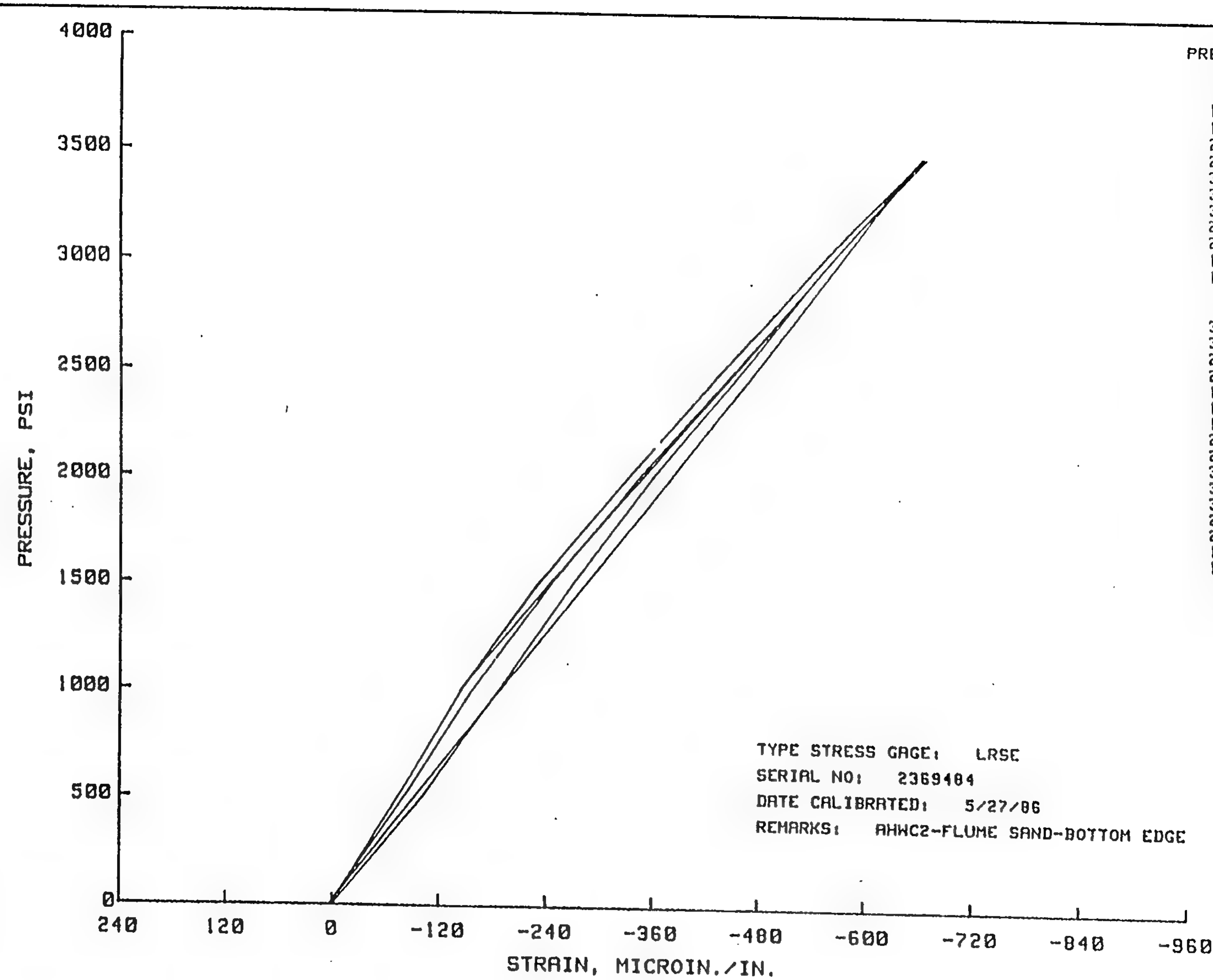
PRESSURE	STRAIN
0	0.0
500	9.1
1000	40.7
1500	106.1
2000	160.9
2500	205.2
3000	237.0
3500	264.3
3000	324.3
2500	377.0
2000	417.0
1500	430.4
1000	407.4
500	321.7
0	16.1
3500	175.7
3000	249.1
2500	310.4
2000	355.7
1500	377.4
1000	364.8
1500	316.5
2000	270.9
2500	231.3
3000	201.7
3500	194.3
3000	270.4
2500	333.0
2000	380.0
1500	403.9
1000	389.1
500	315.2
0	13.5

Plate 171

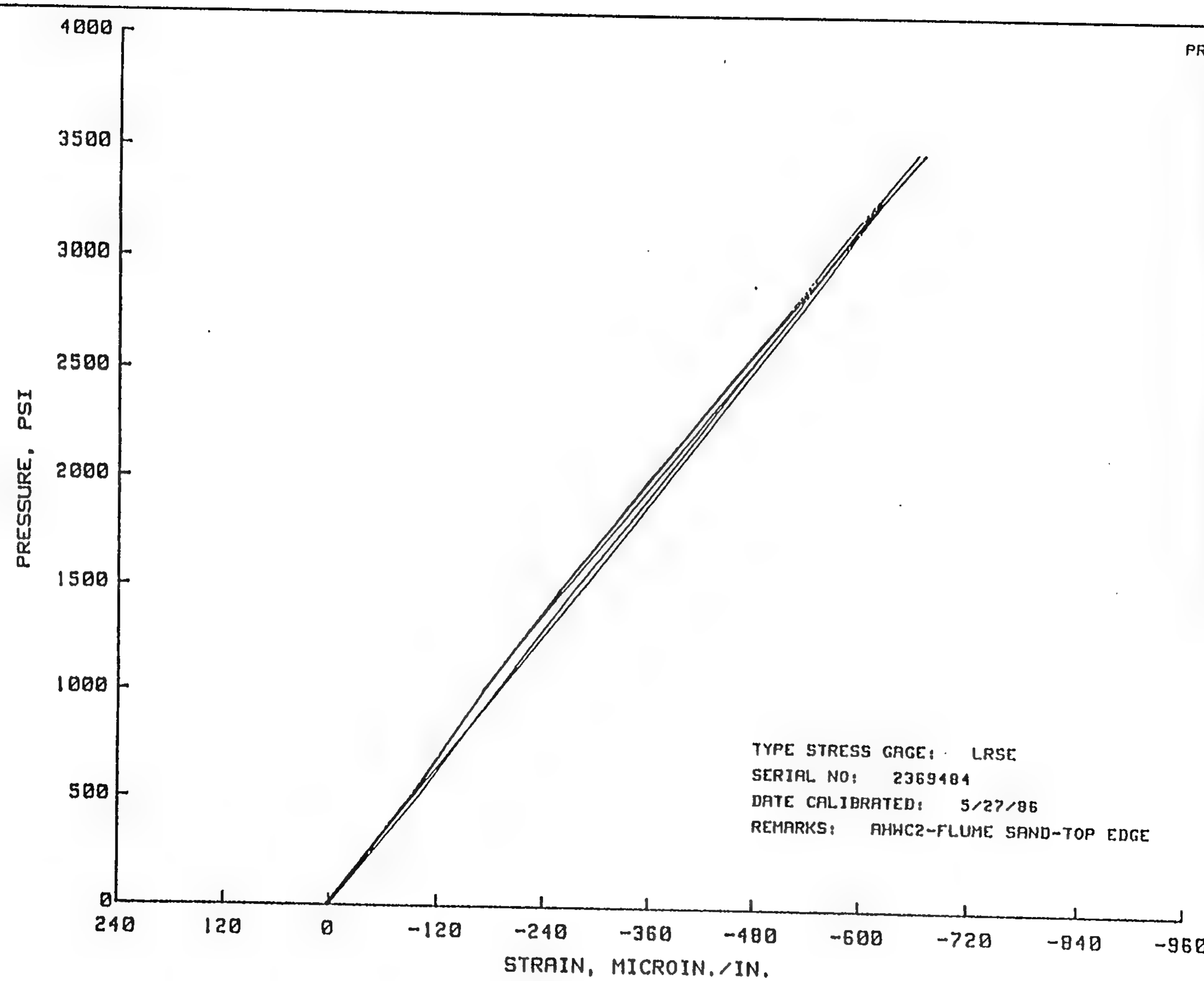


PRESSURE	STRAIN
0	0.0
500	19.1
1000	66.1
1500	128.7
2000	192.6
2500	244.3
3000	289.6
3500	307.4
3000	360.4
2500	409.1
2000	445.2
1500	454.3
1000	426.5
500	333.0
0	21.3
3500	222.6
3000	291.3
2500	347.4
2000	387.4
1500	404.0
1000	386.5
1500	341.7
2000	301.7
2500	267.0
3000	244.3
3500	242.2
3000	312.6
2500	370.9
2000	413.0
1500	432.6
1000	412.2
500	330.0
0	16.5

Plate 172

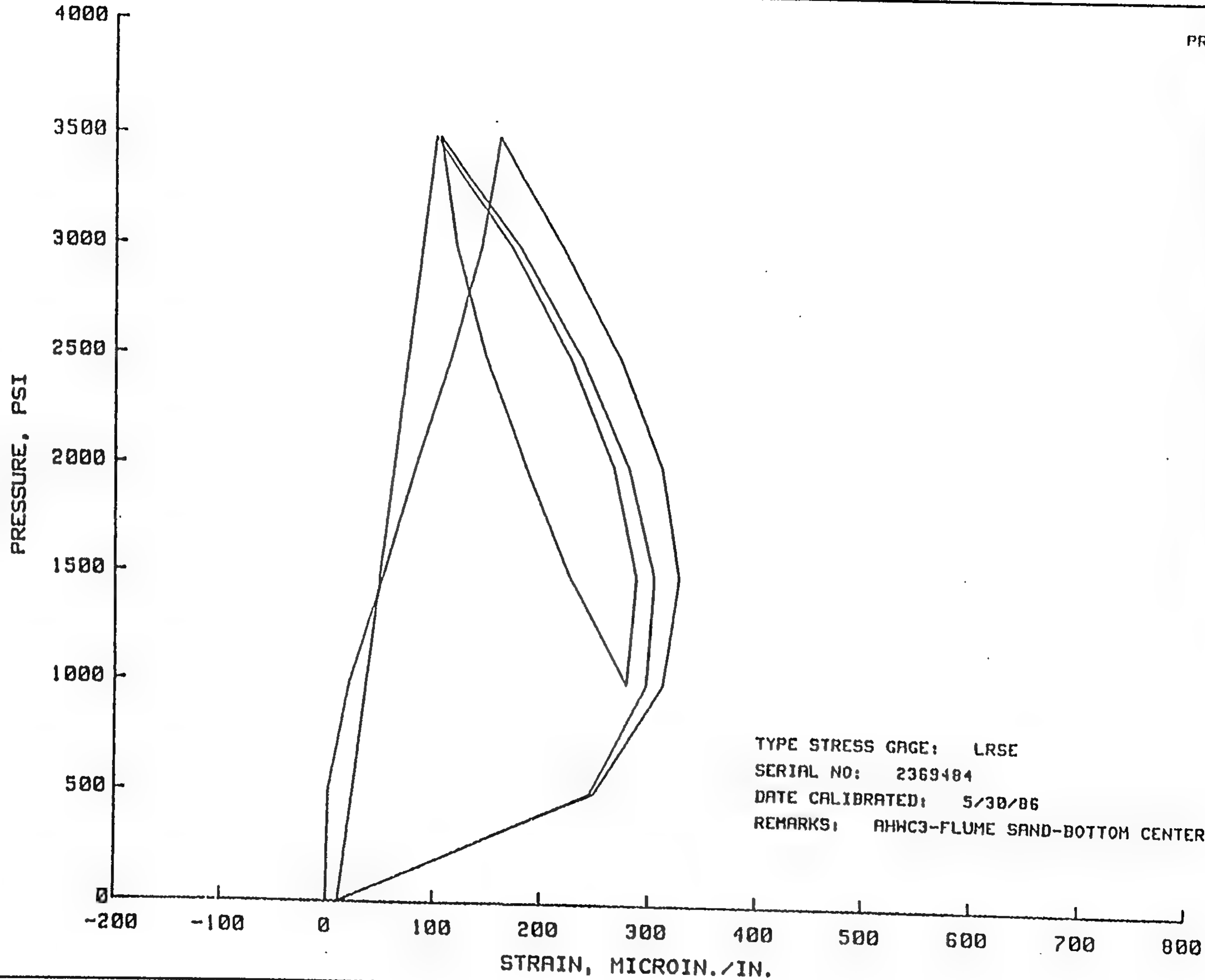


PRESSURE	STRAIN
0	0.0
500	-100.9
1000	-186.5
1500	-269.1
2000	-358.3
2500	-460.0
3000	-559.6
3500	-672.6
3000	-559.1
2500	-450.0
2000	-342.2
1500	-244.3
1000	-156.5
500	-80.0
0	3.9
3500	-667.0
3000	-550.0
2500	-437.0
2000	-330.0
1500	-228.7
1000	-143.0
1500	-242.6
2000	-347.0
2500	-453.5
3000	-560.0
3500	-660.7
3000	-540.3
2500	-435.2
2000	-329.6
1500	-230.0
1000	-144.3
500	-73.0
0	2.6



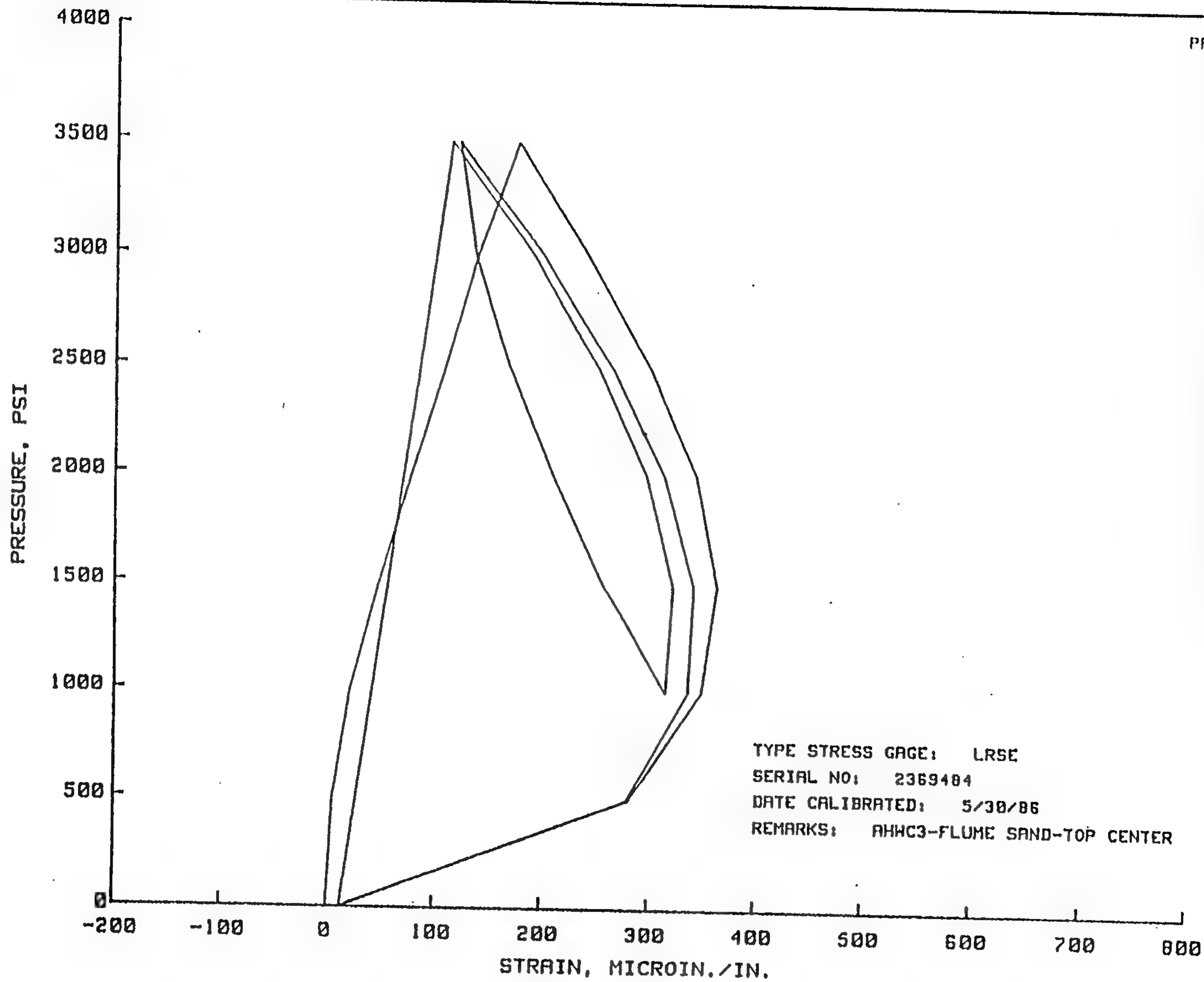
PRESSURE	STRAIN
0	0.0
500	-90.3
1000	-106.5
1500	-277.4
2000	-376.1
2500	-472.6
3000	-569.1
3500	-665.7
3000	-562.6
2500	-460.4
2000	-357.0
1500	-260.9
1000	-170.9
500	-00.7
0	4.3
3500	-672.2
3000	-567.0
2500	-462.2
2000	-360.0
1500	-260.0
1000	-169.6
1500	-266.5
2000	-360.3
2500	-470.9
3000	-570.9
3500	-674.3
3000	-567.4
2500	-463.0
2000	-360.9
1500	-261.7
1000	-171.7
500	-91.3
0	2.2

Plate 174



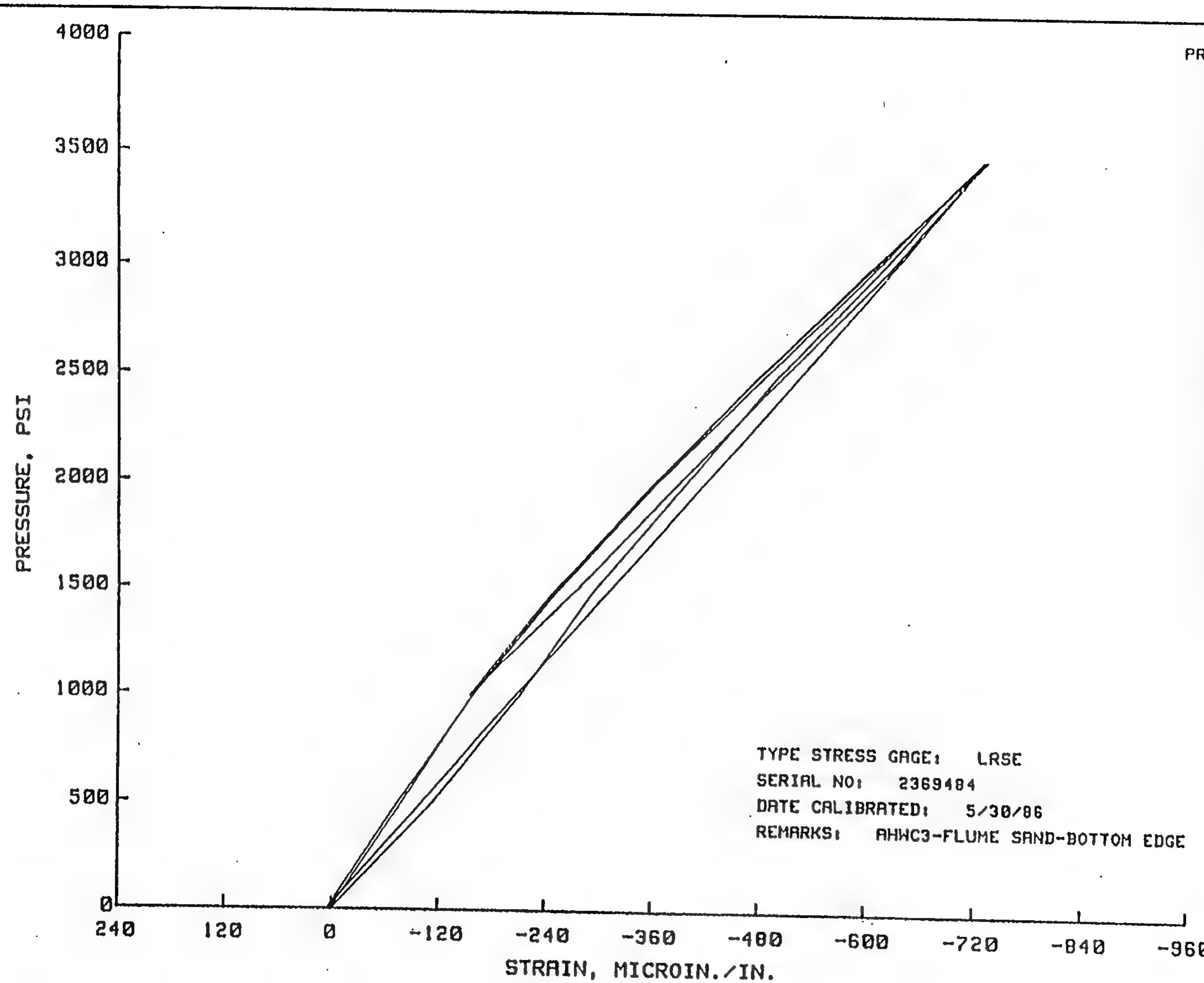
PRESSURE	STRAIN
0	0.0
500	1.3
1000	21.3
1500	53.5
2000	83.0
2500	116.1
3000	143.5
3500	160.9
3000	220.0
2500	273.0
2000	312.2
1500	328.3
1000	312.6
500	248.7
0	10.9
3500	101.3
3000	171.7
2500	226.5
2000	267.4
1500	288.3
1000	279.1
1500	225.7
2000	184.8
2500	147.0
3000	119.6
3500	104.0
3000	179.6
2500	237.4
2000	281.3
1500	304.8
1000	297.4
500	245.2
0	9.1

Plate 176

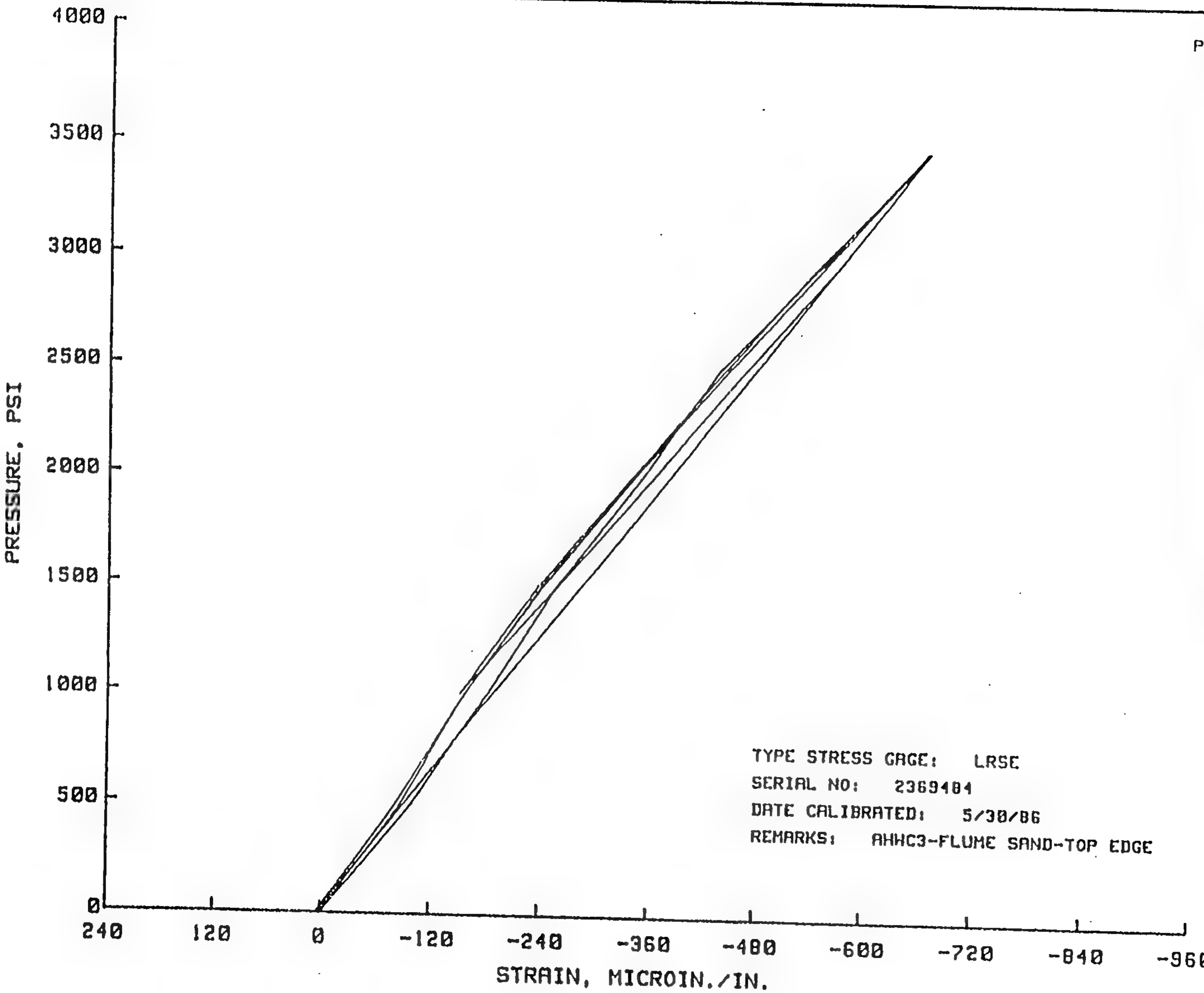


PRESSURE	STRAIN
0	0.0
500	5.2
1000	21.3
1500	47.0
2000	70.3
2500	109.6
3000	139.1
3500	176.5
3000	243.0
2500	300.9
2000	345.7
1500	365.2
1000	350.0
500	281.3
0	12.2
3500	114.0
3000	191.7
2500	252.2
2000	298.3
1500	323.5
1000	316.1
1500	257.0
2000	210.0
2500	160.3
3000	136.5
3500	121.3
3000	200.9
2500	265.2
2000	315.2
1500	343.0
1000	337.4
500	279.6
0	10.4

TYPE STRESS GAGE: LRSE
SERIAL NO: 2369404
DATE CALIBRATED: 5/30/86
REMARKS: AHWC3-FLUME SAND-TOP CENTER



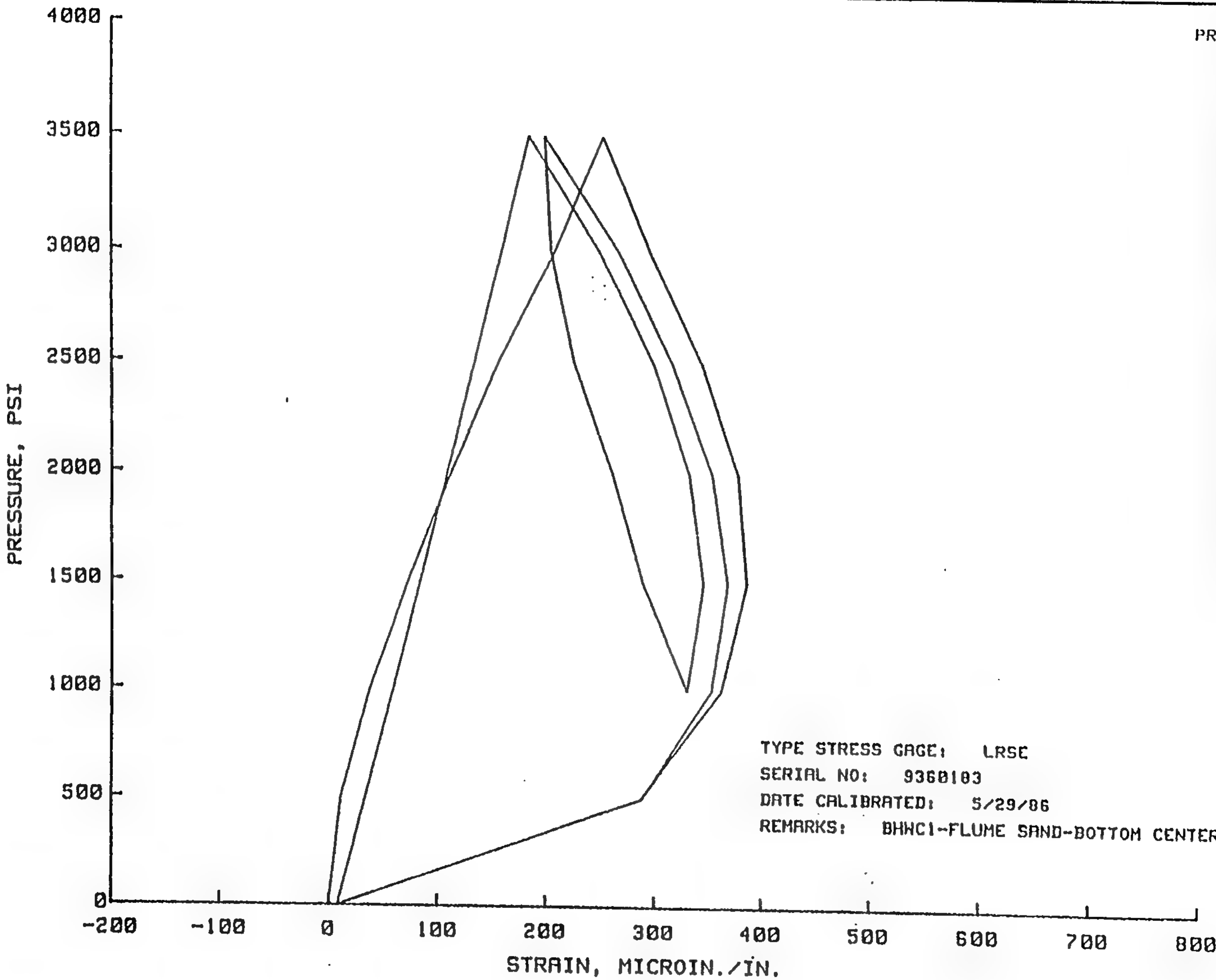
PRESSURE	STRAIN
0	0.0
500	-113.5
1000	-212.6
1500	-296.5
2000	-399.6
2500	-502.2
3000	-620.0
3500	-734.3
3000	-612.2
2500	-487.0
2000	-365.7
1500	-255.7
1000	-160.0
500	-73.9
0	5.2
3500	-739.6
3000	-605.2
2500	-480.9
2000	-363.0
1500	-251.7
1000	-155.7
1500	-276.1
2000	-390.9
2500	-507.8
3000	-629.1
3500	-737.0
3000	-607.8
2500	-480.4
2000	-362.6
1500	-254.8
1000	-158.7
500	-78.3
0	1.7



PRESSURE	STRAIN
0	0.0
500	-100.0
1000	-103.5
1500	-250.7
2000	-351.7
2500	-439.6
3000	-557.0
3500	-671.3
3000	-562.2
2500	-450.0
2000	-341.3
1500	-241.7
1000	-157.8
500	-82.2
0	5.7
3500	-674.3
3000	-553.9
2500	-444.8
2000	-339.1
1500	-230.3
1000	-152.2
1500	-260.0
2000	-364.3
2500	-469.1
3000	-577.4
3500	-674.3
3000	-561.3
2500	-449.1
2000	-342.6
1500	-244.3
1000	-157.8
500	-87.4
0	1.3

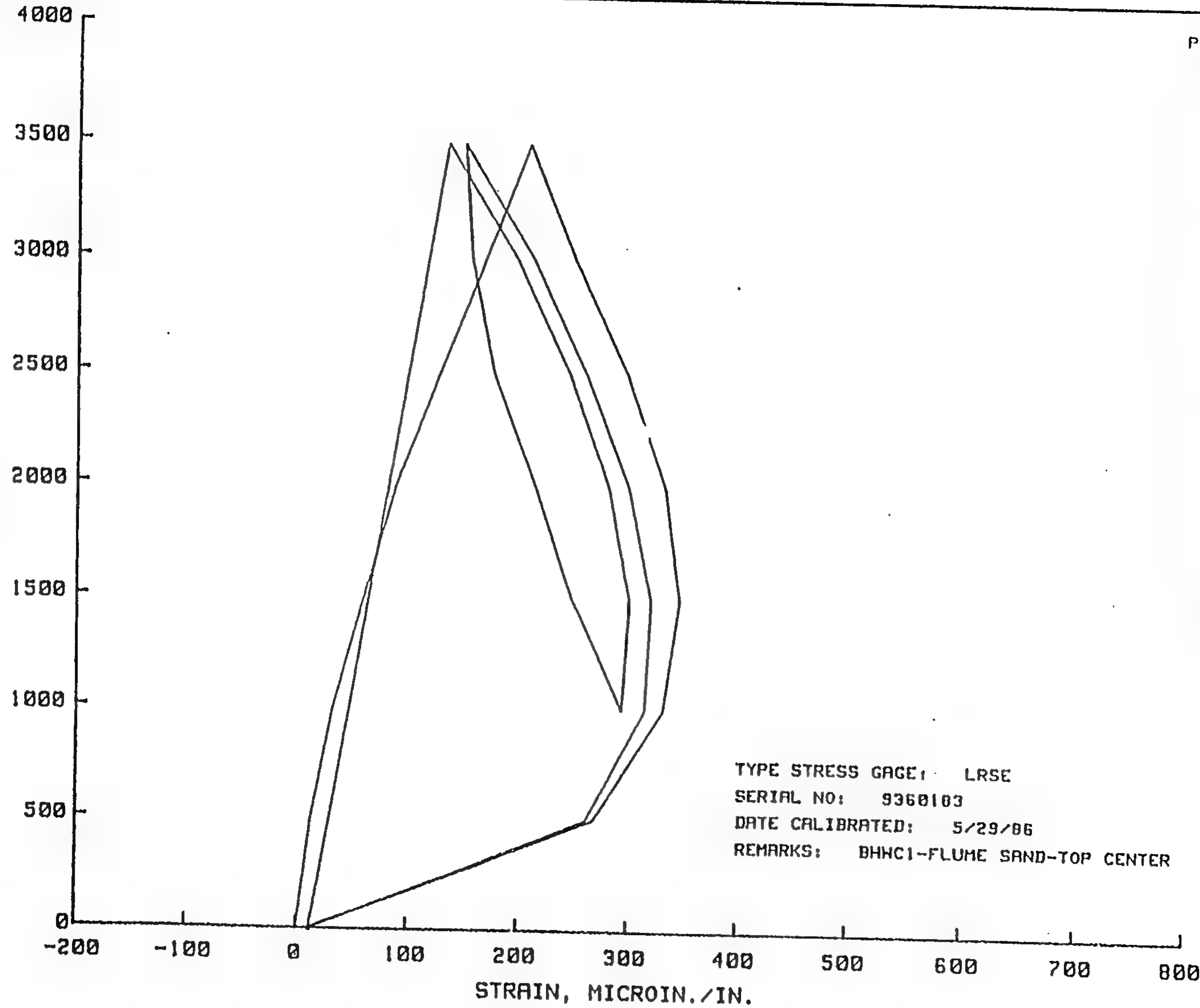
TYPE STRESS GAGE: LRSE
SERIAL NO: 2369404
DATE CALIBRATED: 5/30/86
REMARKS: AHHC3-FLUME SAND-TOP EDGE

Plate 178



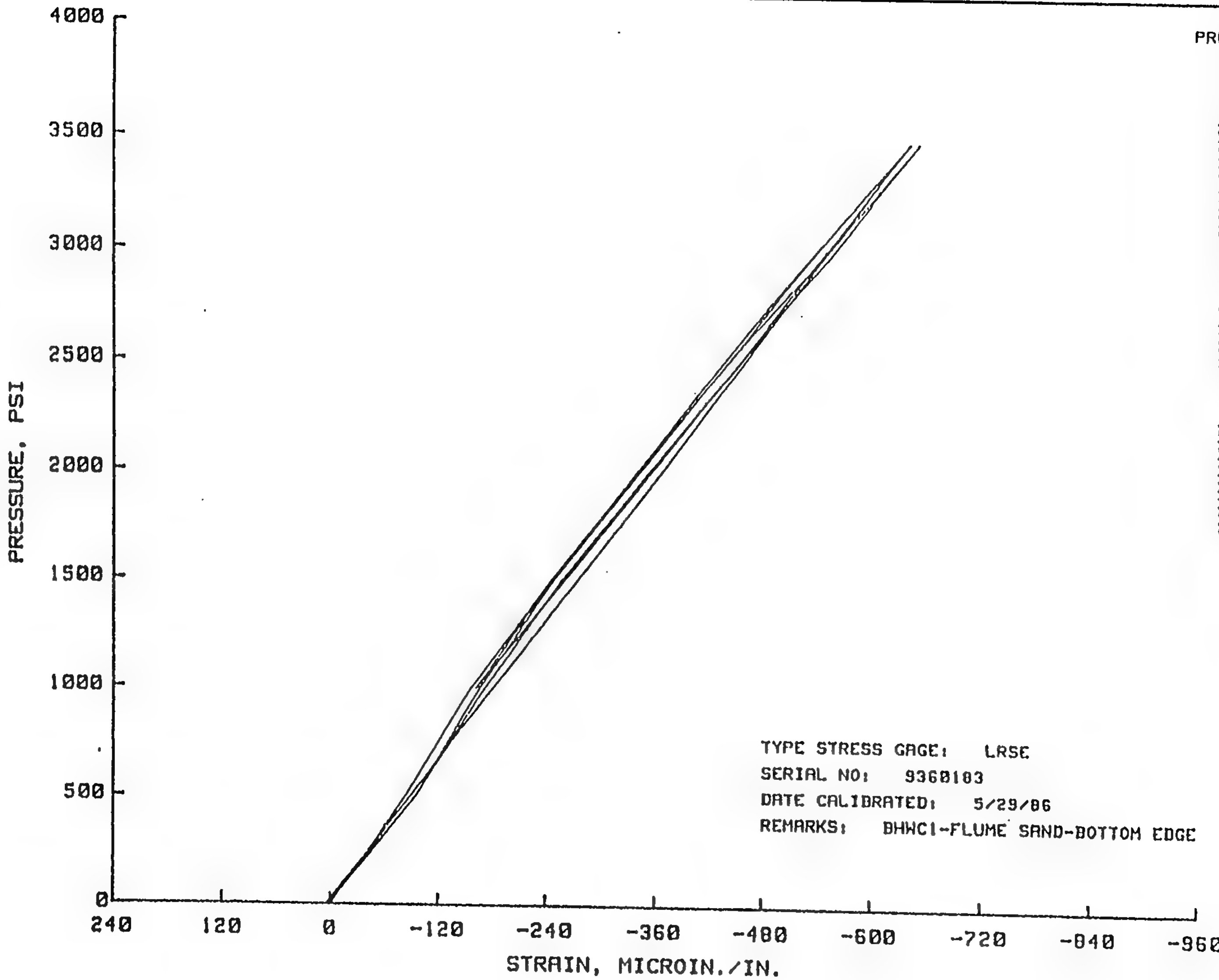
PRESSURE	STRAIN
0	0.0
500	10.9
1000	37.4
1500	72.6
2000	113.0
2500	157.0
3000	209.1
3500	253.9
3000	297.4
2500	346.1
2000	379.6
1500	387.4
1000	362.6
500	287.0
0	7.0
3500	185.7
3000	250.4
2500	300.0
2000	333.9
1500	347.0
1000	330.9
1500	289.1
2000	261.3
2500	226.1
3000	205.2
3500	199.6
3000	260.3
2500	317.0
2000	355.7
1500	369.6
1000	353.5
500	287.0
0	6.5

TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 5/29/86
REMARKS: BHHC1-FLUME SAND-BOTTOM CENTER



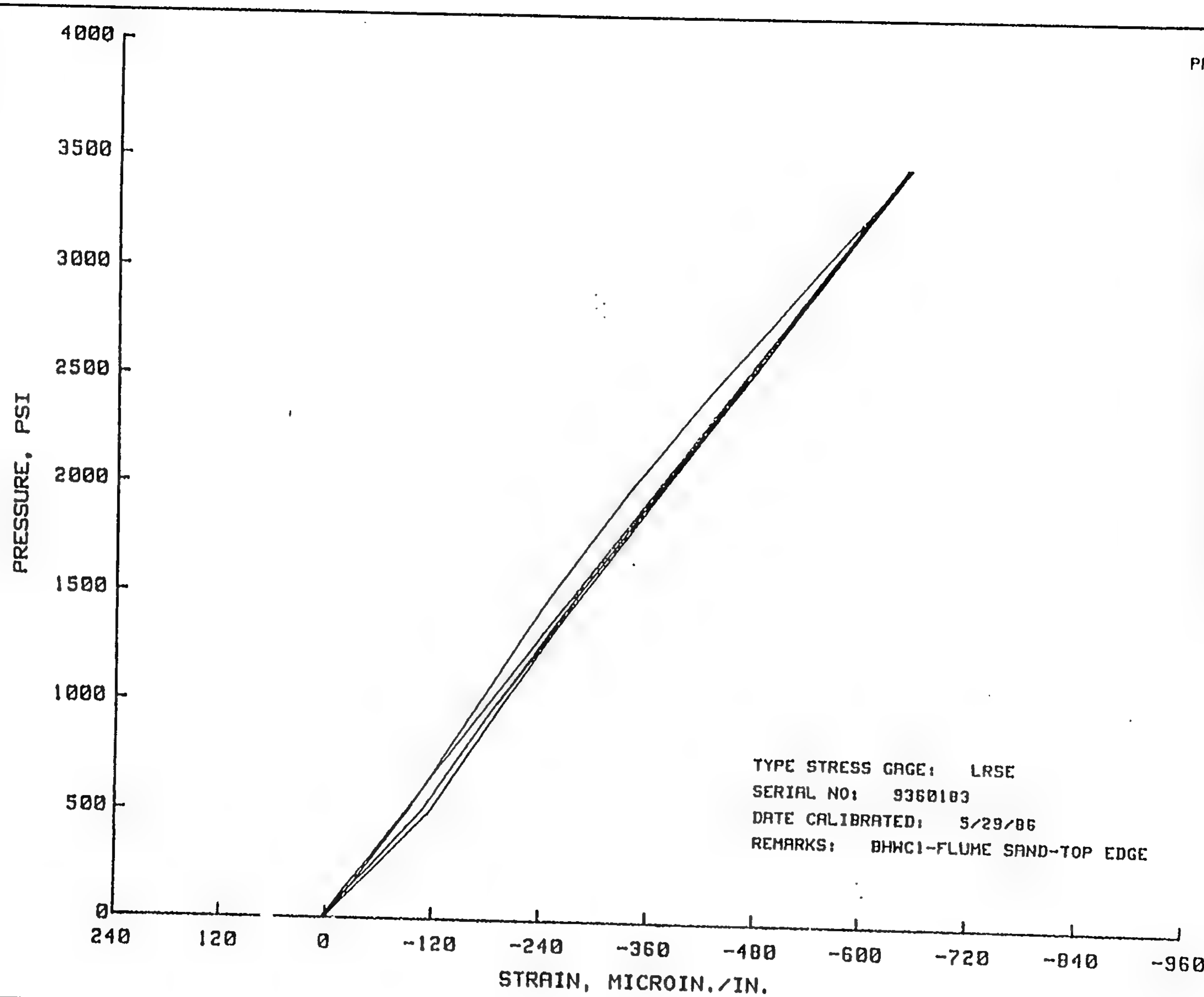
PRESSURE	STRAIN
0	0.0
500	12.6
1000	31.7
1500	60.0
2000	80.7
2500	120.3
3000	160.7
3500	208.7
3000	250.4
2500	290.7
2000	334.3
1500	347.8
1000	331.7
500	267.8
0	11.3
3500	134.8
3000	197.4
2500	245.7
2000	281.7
1500	301.3
1000	293.9
1500	248.3
2000	214.3
2500	176.1
3000	155.7
3500	149.1
3000	212.6
2500	260.9
2000	300.4
1500	321.3
1000	314.8
500	261.3
0	9.6

Plate 180



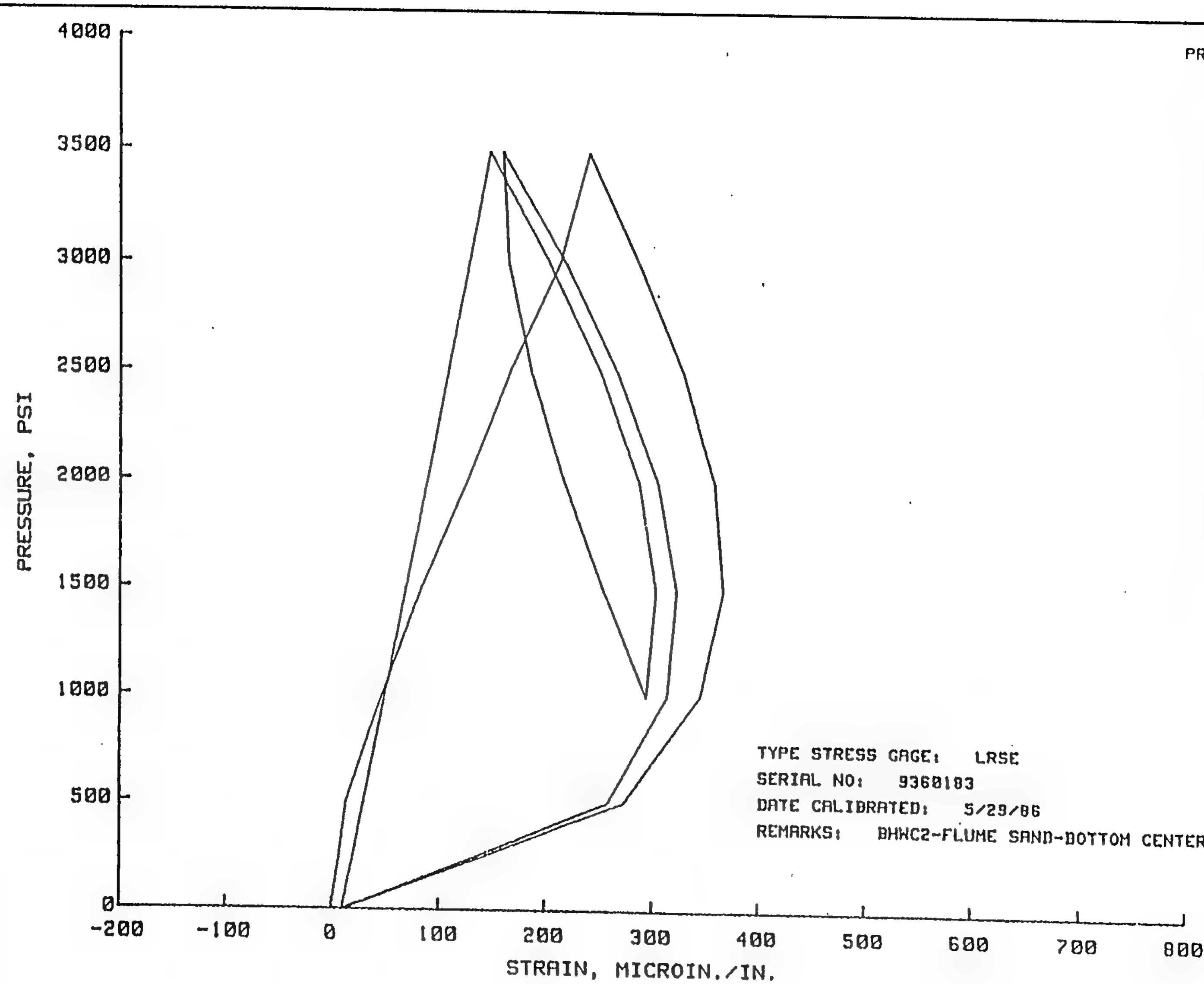
PRESSURE	STRAIN
0	0.0
500	-03.0
1000	-157.0
1500	-246.1
2000	-342.6
2500	-441.7
3000	-553.0
3500	-657.0
3000	-559.1
2500	-454.0
2000	-352.6
1500	-257.0
1000	-172.2
500	-93.9
0	4.0
3500	-646.5
3000	-538.3
2500	-436.5
2000	-339.1
1500	-245.7
1000	-162.2
1500	-260.9
2000	-355.7
2500	-455.7
3000	-550.4
3500	-647.4
3000	-540.0
2500	-441.7
2000	-341.7
1500	-240.3
1000	-166.5
500	-94.3
0	2.6

Plate 181



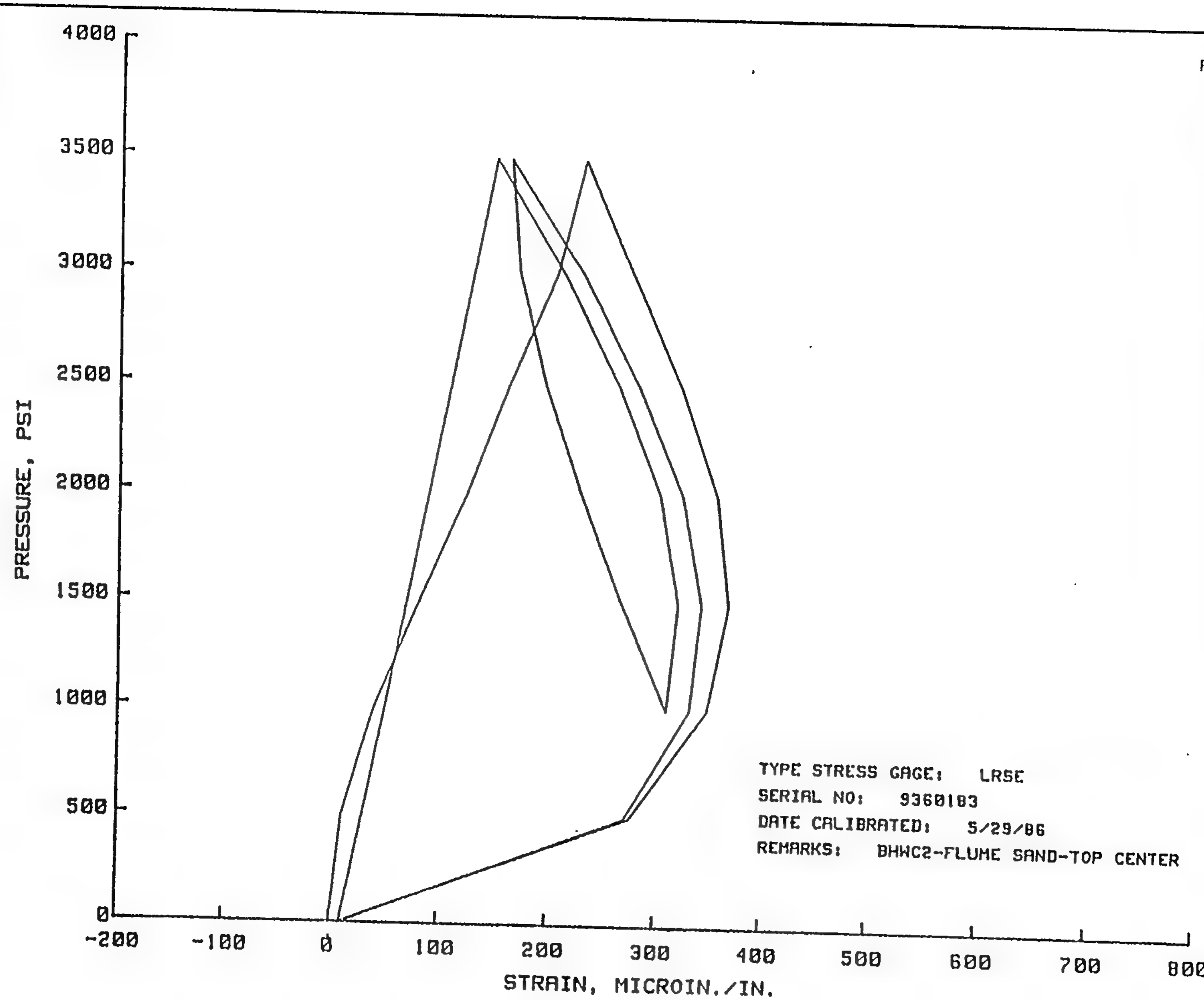
PRESSURE	STRAIN
0	0.0
500	-91.7
1000	-171.3
1500	-250.9
2000	-340.0
2500	-439.1
3000	-545.7
3500	-654.8
3000	-562.2
2500	-467.0
2000	-372.2
1500	-279.1
1000	-190.4
500	-106.1
0	4.8
3500	-649.6
3000	-557.4
2500	-463.5
2000	-372.2
1500	-280.4
1000	-191.7
1500	-285.2
2000	-375.7
2500	-469.1
3000	-558.3
3500	-652.2
3000	-559.6
2500	-469.6
2000	-376.5
1500	-284.8
1000	-197.4
500	-115.7
0	2.2

Plate 182



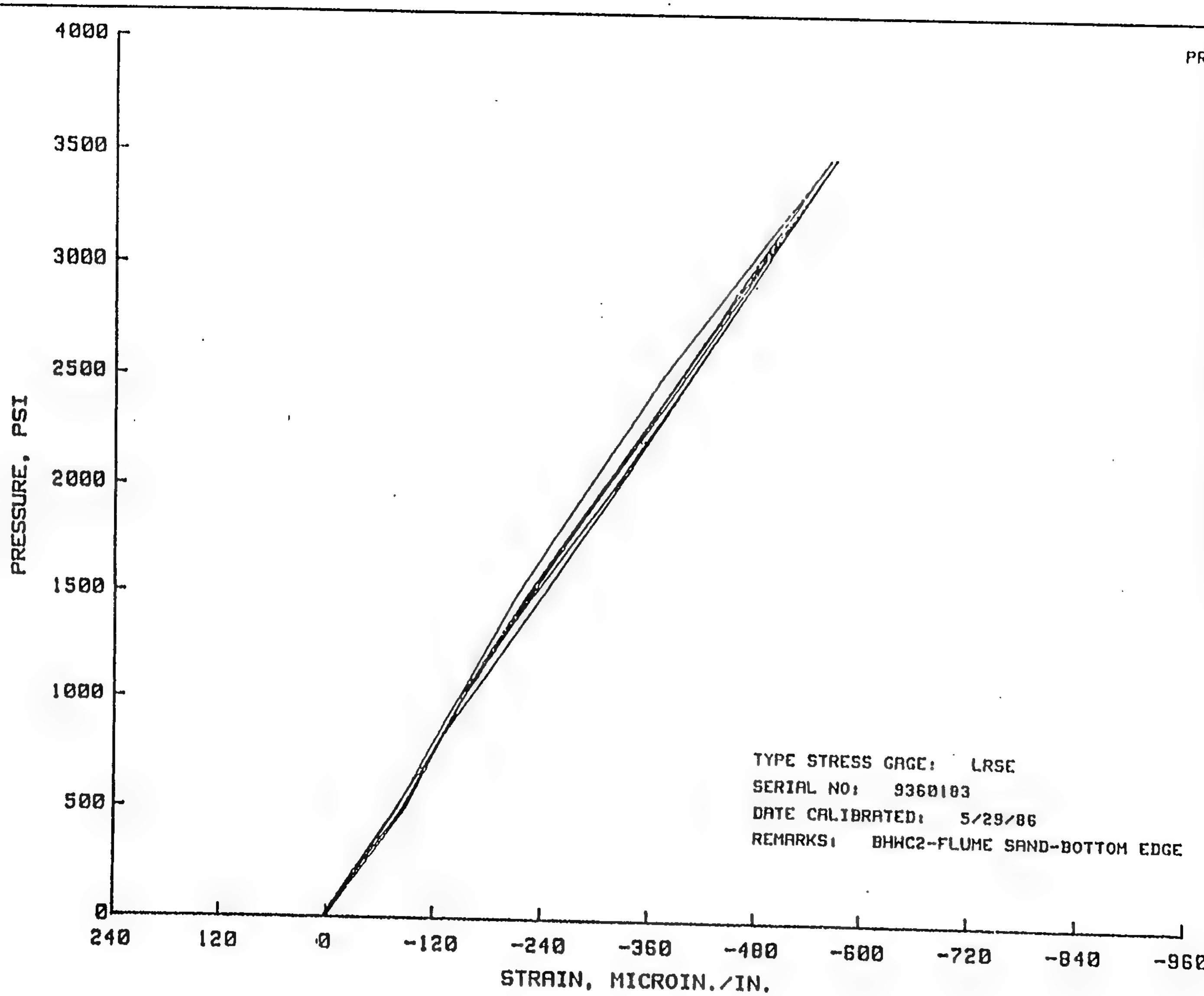
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 5/29/86
REMARKS: BHWC2-FLUME SAND-BOTTOM CENTER

PRESSURE	STRAIN
0	0.0
500	13.5
1000	46.5
1500	03.5
2000	126.5
2500	166.5
3000	213.5
3500	241.7
3000	280.3
2500	330.0
2000	359.1
1500	367.4
1000	344.3
500	272.2
0	9.6
3500	140.3
3000	204.3
2500	252.2
2000	207.0
1500	303.9
1000	293.9
1500	253.9
2000	217.4
2500	106.1
3000	164.0
3500	159.6
3000	220.0
2500	267.0
2000	305.7
1500	323.5
1000	313.5
500	257.0
0	8.7

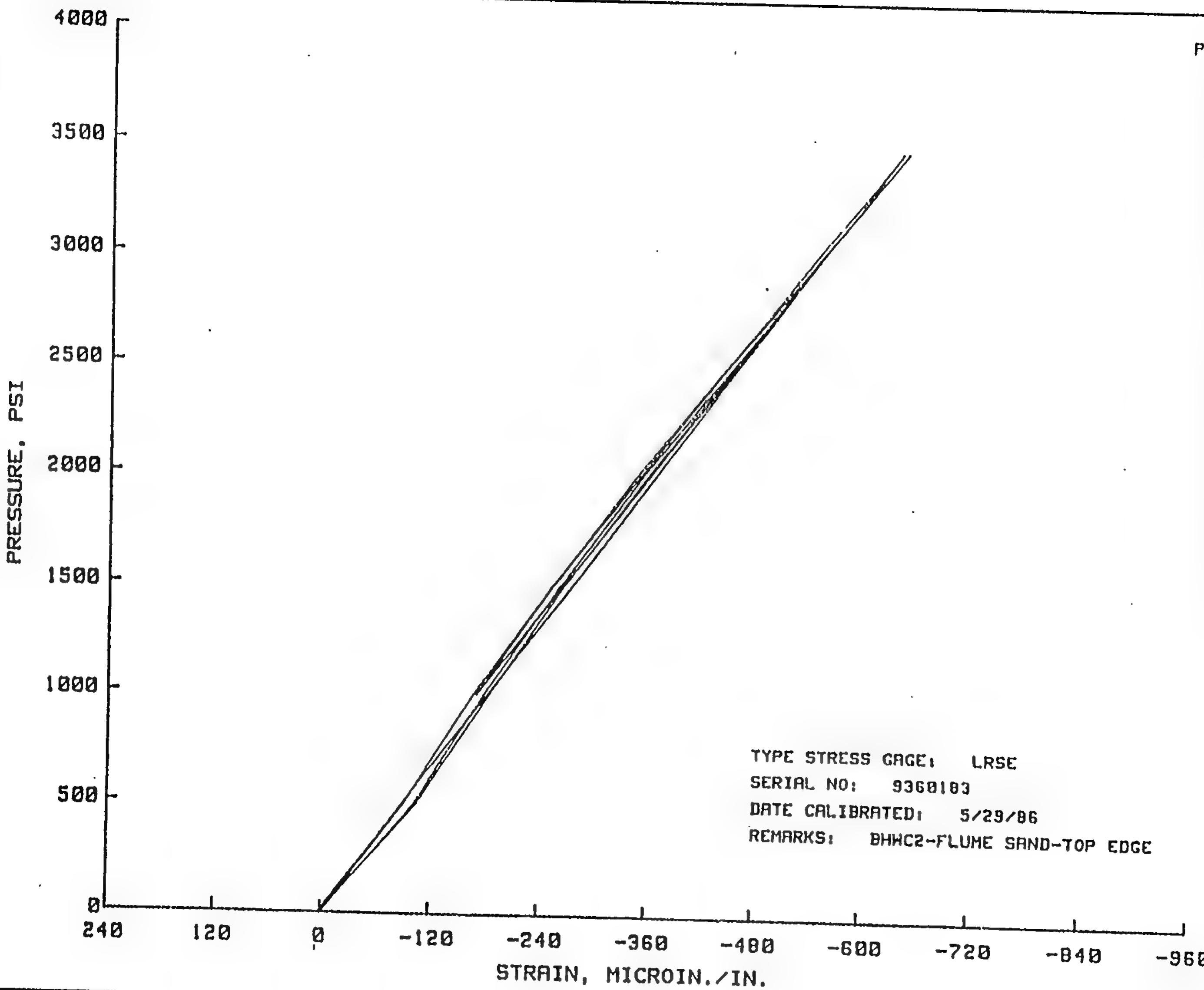


PRESSURE	STRAIN
0	0.0
500	10.0
1000	39.6
1500	81.3
2000	125.7
2500	163.5
3000	206.5
3500	232.2
3000	277.4
2500	323.5
2000	357.0
1500	369.1
1000	340.3
500	275.7
0	9.1
3500	150.4
3000	213.0
2500	264.8
2000	303.9
1500	321.3
1000	310.0
1500	267.4
2000	229.6
2500	196.1
3000	171.3
3500	163.0
3000	230.9
2500	283.5
2000	325.2
1500	343.5
1000	331.7
500	271.3
0	0.7

Plate 184



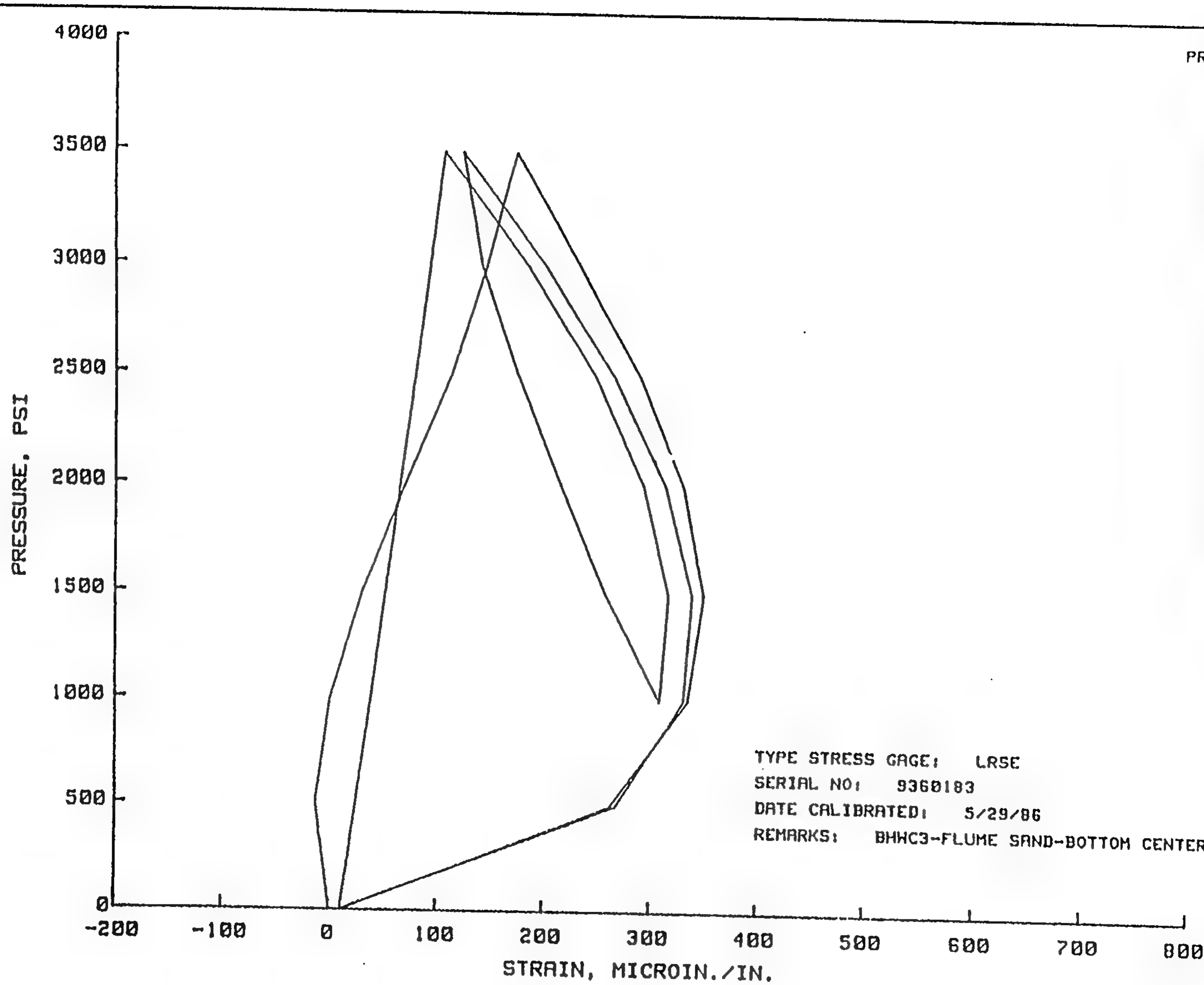
PRESSURE	STRAIN
0	0.0
500	-79.6
1000	-140.3
1500	-213.5
2000	-292.2
2500	-374.3
3000	-470.0
3500	-567.0
3000	-477.0
2500	-393.5
2000	-300.7
1500	-226.1
1000	-151.7
500	-85.2
0	4.3
3500	-571.7
3000	-481.3
2500	-395.7
2000	-307.8
1500	-224.3
1000	-148.7
1500	-233.0
2000	-320.9
2500	-405.7
3000	-489.6
3500	-573.5
3000	-484.8
2500	-399.6
2000	-311.3
1500	-229.1
1000	-153.5
500	-88.7
0	.9



PRESSURE	STRAIN
0	0.0
500	-91.3
1000	-167.4
1500	-253.0
2000	-350.0
2500	-447.4
3000	-549.6
3500	-652.2
3000	-550.4
2500	-454.3
2000	-357.0
1500	-265.7
1000	-104.3
500	-105.2
0	3.0
3500	-645.7
3000	-544.8
2500	-445.7
2000	-345.7
1500	-253.0
1000	-170.4
1500	-264.8
2000	-361.3
2500	-457.0
3000	-552.2
3500	-651.3
3000	-550.9
2500	-452.2
2000	-352.6
1500	-261.3
1000	-170.3
500	-102.6
0	.4

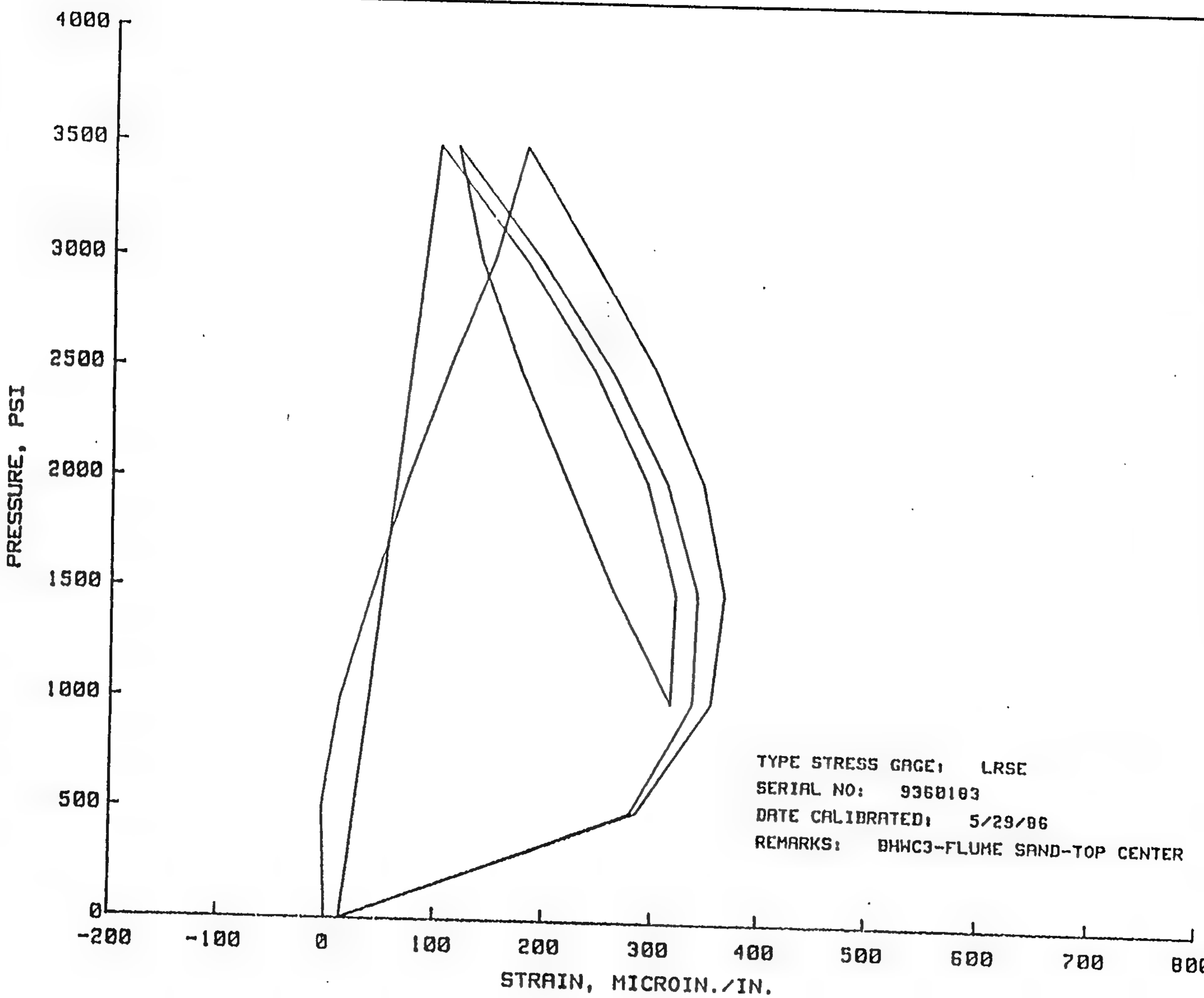
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 5/29/86
REMARKS: BHWC2-FLUME SAND-TOP EDGE

Plate 186



PRESSURE	STRAIN
0	0.0
500	-13.5
1000	.4
1500	30.4
2000	70.9
2500	114.3
3000	147.4
3500	175.7
3000	235.2
2500	290.9
2000	332.6
1500	351.7
1000	335.7
500	263.0
0	10.0
3500	100.3
3000	186.1
2500	249.1
2000	294.0
1500	318.3
1000	309.1
1500	258.7
2000	216.5
2500	175.7
3000	142.2
3500	124.0
3000	202.6
2500	266.5
2000	315.7
1500	340.9
1000	331.7
500	260.3
0	0.3

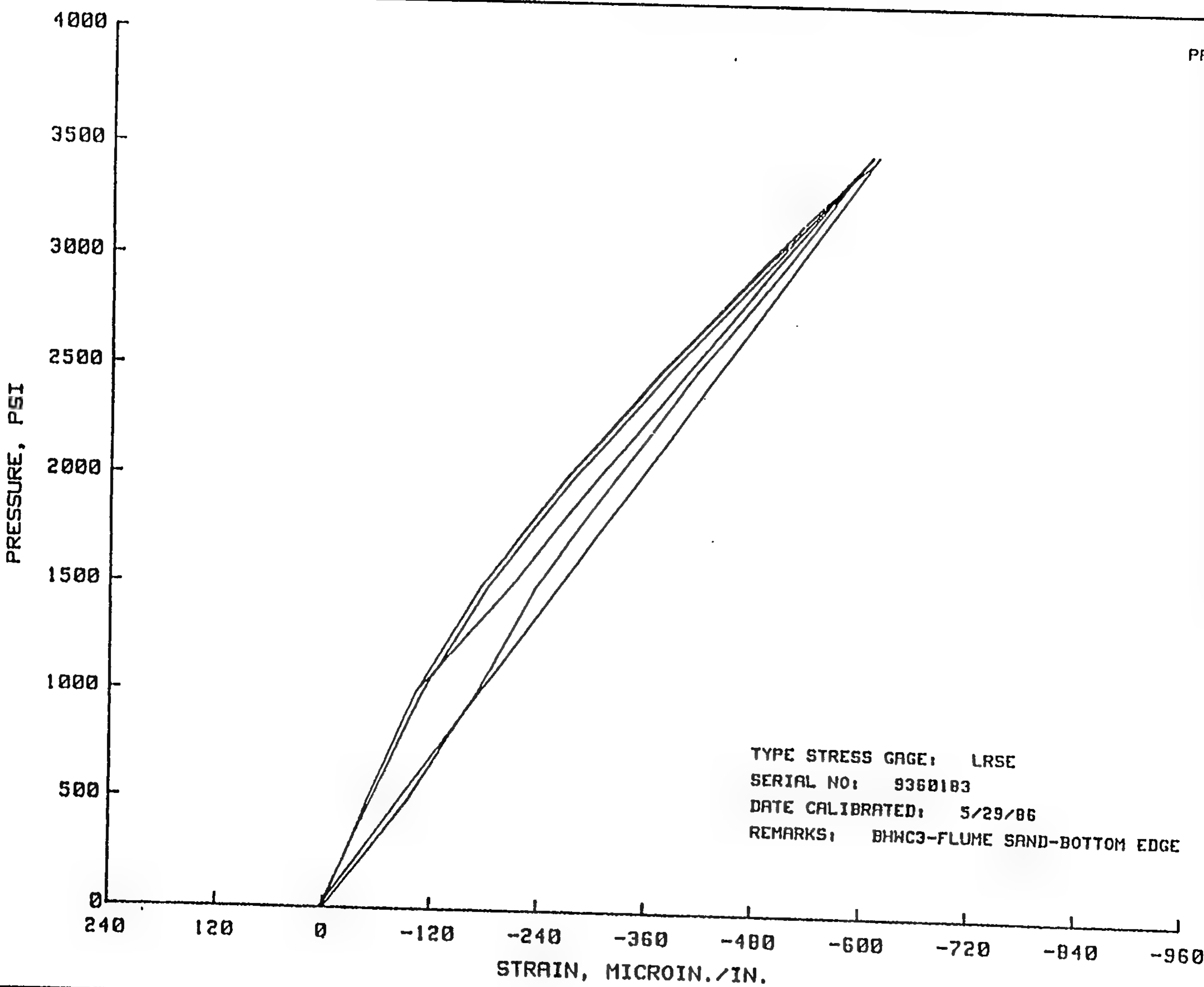
Plate 187



PRESSURE	STRAIN
0	0.0
500	-4.3
1000	11.7
1500	42.2
2000	73.0
2500	110.0
3000	150.9
3500	179.6
3000	243.0
2500	301.3
2000	346.5
1500	367.4
1000	354.3
500	284.0
0	13.5
3500	100.0
3000	179.6
2500	244.3
2000	293.5
1500	320.9
1000	316.1
1500	263.0
2000	219.6
2500	175.2
3000	130.3
3500	115.2
3000	194.3
2500	260.4
2000	312.2
1500	341.7
1000	337.0
500	279.6
0	11.3

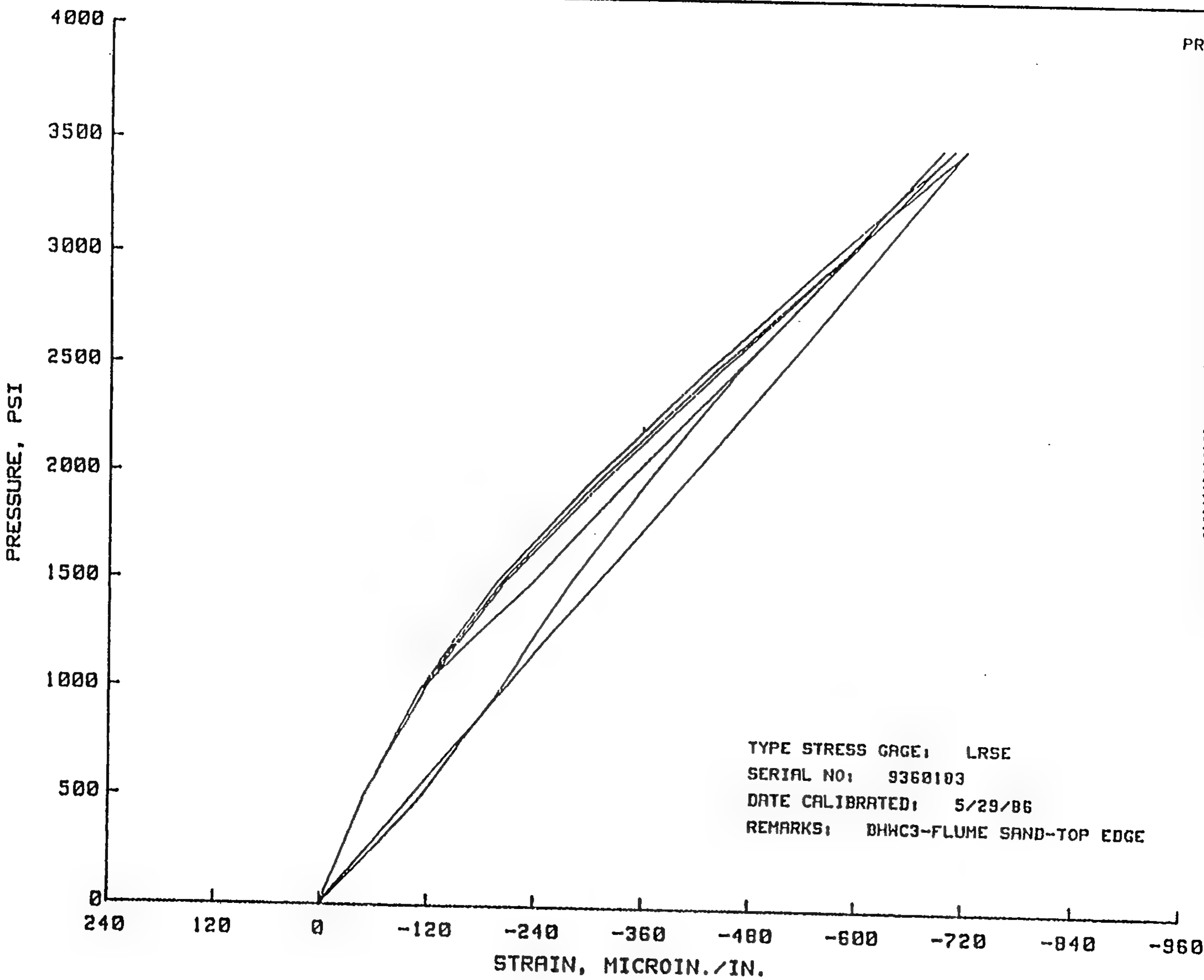
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 5/29/86
REMARKS: BHWC3-FLUME SAND-TOP CENTER

Plate 188



PRESSURE	STRAIN
0	0.0
500	-94.3
1000	-170.9
1500	-236.5
2000	-323.9
2500	-415.2
3000	-516.1
3500	-600.7
3000	-497.0
2500	-303.0
2000	-276.5
1500	-182.6
1000	-109.1
500	-52.6
0	4.3
3500	-617.0
3000	-491.7
2500	-375.2
2000	-269.6
1500	-175.7
1000	-102.2
1500	-208.3
2000	-303.5
2500	-404.8
3000	-505.2
3500	-610.4
3000	-488.7
2500	-373.5
2000	-267.4
1500	-174.3
1000	-102.2
500	-48.7
0	1.3

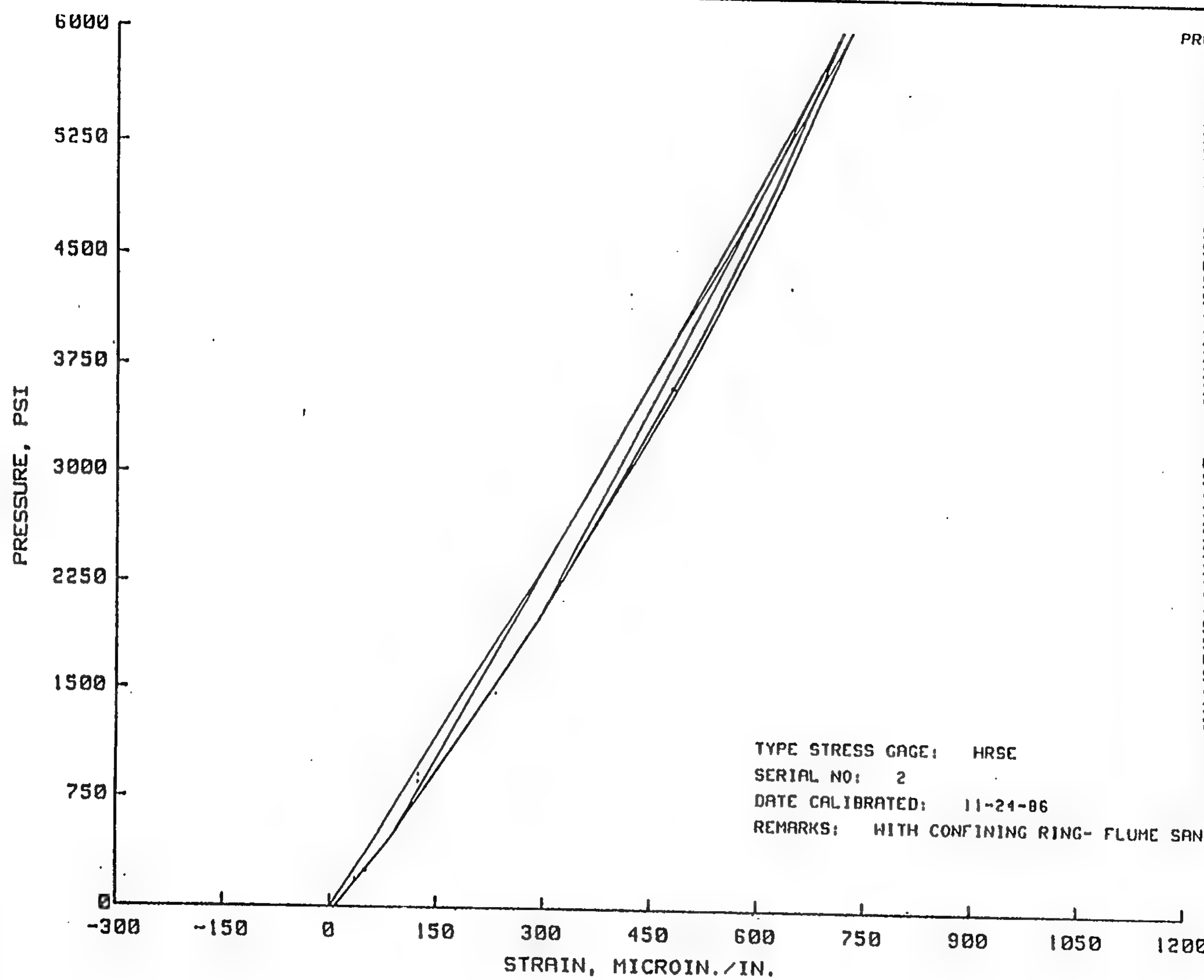
TYPE STRESS GAGE: LRSE
SERIAL NO: 9360183
DATE CALIBRATED: 5/29/86
REMARKS: BHWC3-FLUME SAND-BOTTOM EDGE



PRESSURE	STRAIN
0	0.0
500	-113.0
1000	-201.7
1500	-200.0
2000	-369.1
2500	-460.3
3000	-584.3
3500	-697.8
3000	-501.7
2500	-447.4
2000	-320.9
1500	-206.5
1000	-117.4
500	-48.3
0	2.2
3500	-723.9
3000	-580.0
2500	-441.7
2000	-315.2
1500	-202.6
1000	-114.3
1500	-237.8
2000	-347.4
2500	-466.1
3000	-587.0
3500	-710.4
3000	-569.1
2500	-432.6
2000	-307.4
1500	-197.4
1000	-112.2
500	-47.8
0	.9

TYPE STRESS GAGE: LRSE
SERIAL NO: 9360103
DATE CALIBRATED: 5/29/86
REMARKS: DHHC3-FLUME SAND-TOP EDGE

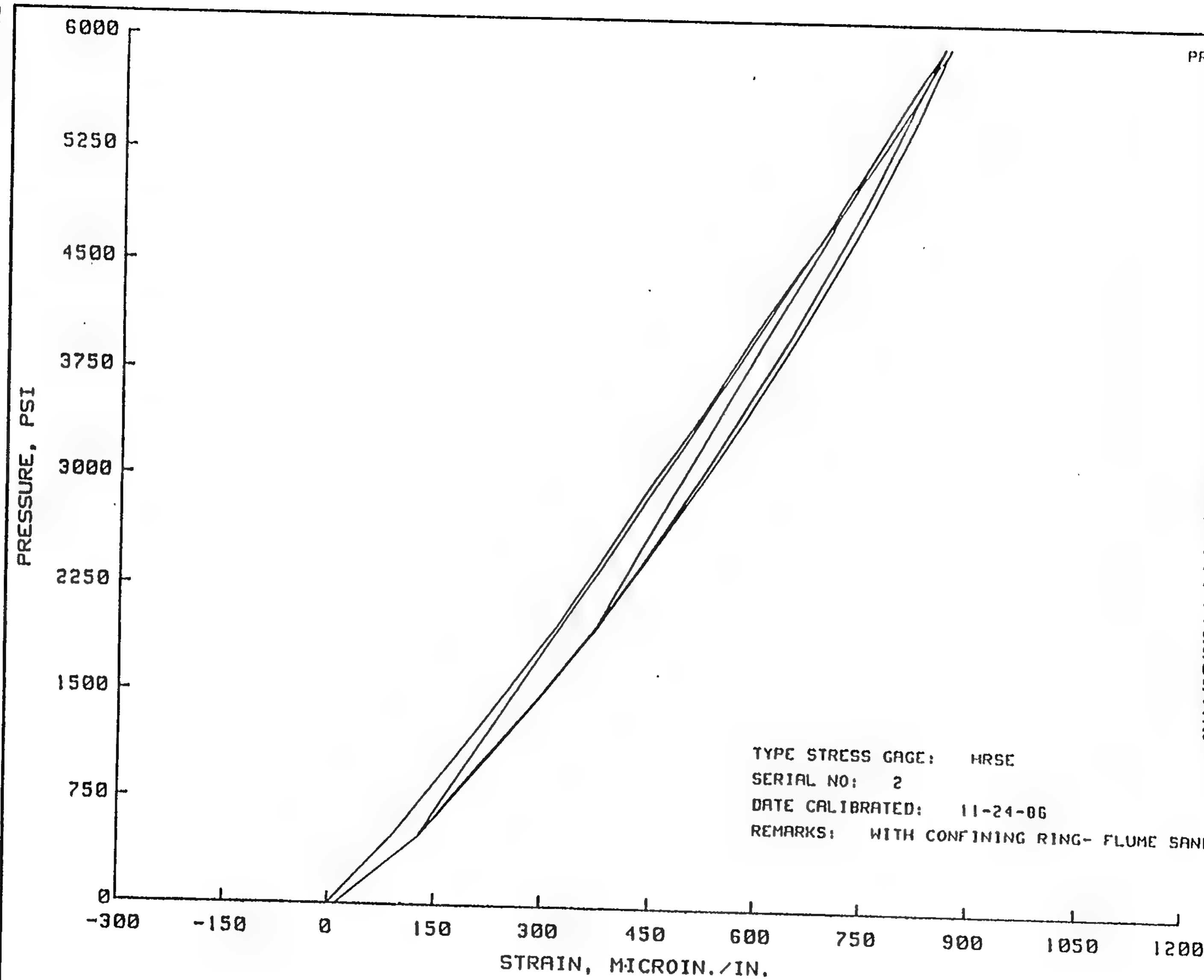
Plate 190



PRESSURE	STRAIN
0	0.0
500	67.4
1000	128.3
1500	191.3
2000	256.5
2500	319.6
3000	380.4
3500	436.5
4000	495.2
4500	558.7
5000	616.1
5500	675.2
6000	735.7
5500	685.7
5000	638.3
4500	587.0
4000	533.9
3500	477.8
3000	419.1
2500	356.5
2000	293.9
1500	228.7
1000	157.8
500	89.6
6000	723.5
5000	629.6
4000	527.4
3000	415.2
2000	294.0
2500	347.8
3000	403.8
3500	455.7
4000	509.1
4500	563.5
5000	617.0
5500	668.3
6000	721.3
5000	629.6
4000	527.4
3000	414.3
2000	295.7
1500	228.7
1000	159.1
500	89.1
0	6.1

TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-24-86
REMARKS: WITH CONFINING RING- FLUME SAND -BOTTOM CENTER (RUN #1)

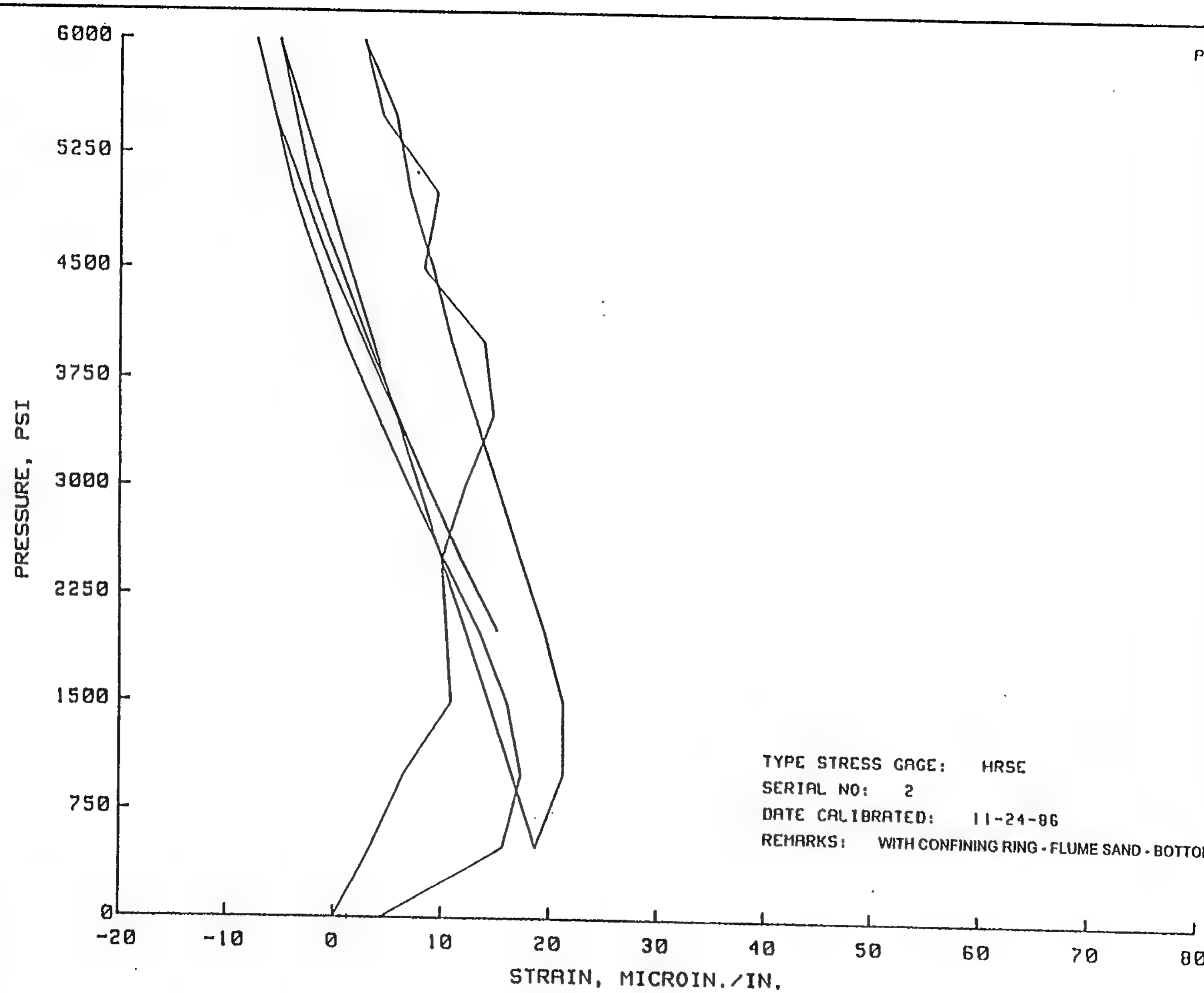
Plate 191



PRESSURE	STRAIN
0	0.0
500	92.2
1000	171.3
1500	247.0
2000	322.6
2500	307.4
3000	453.0
3500	523.9
4000	500.7
4500	657.0
5000	734.3
5500	802.6
6000	860.3
5500	021.3
5000	760.7
4500	711.3
4000	651.7
3500	580.7
3000	521.3
2500	449.6
2000	376.1
1500	298.3
1000	212.2
500	127.4
6000	860.9
5000	757.0
4000	642.2
3000	515.2
2000	376.1
2500	431.7
3000	491.7
3500	550.0
4000	609.6
4500	670.9
5000	732.2
5500	792.6
6000	859.6
5000	757.4
4000	643.0
3000	515.7
2000	379.1
1500	300.4
1000	216.5
500	129.6
0	10.4

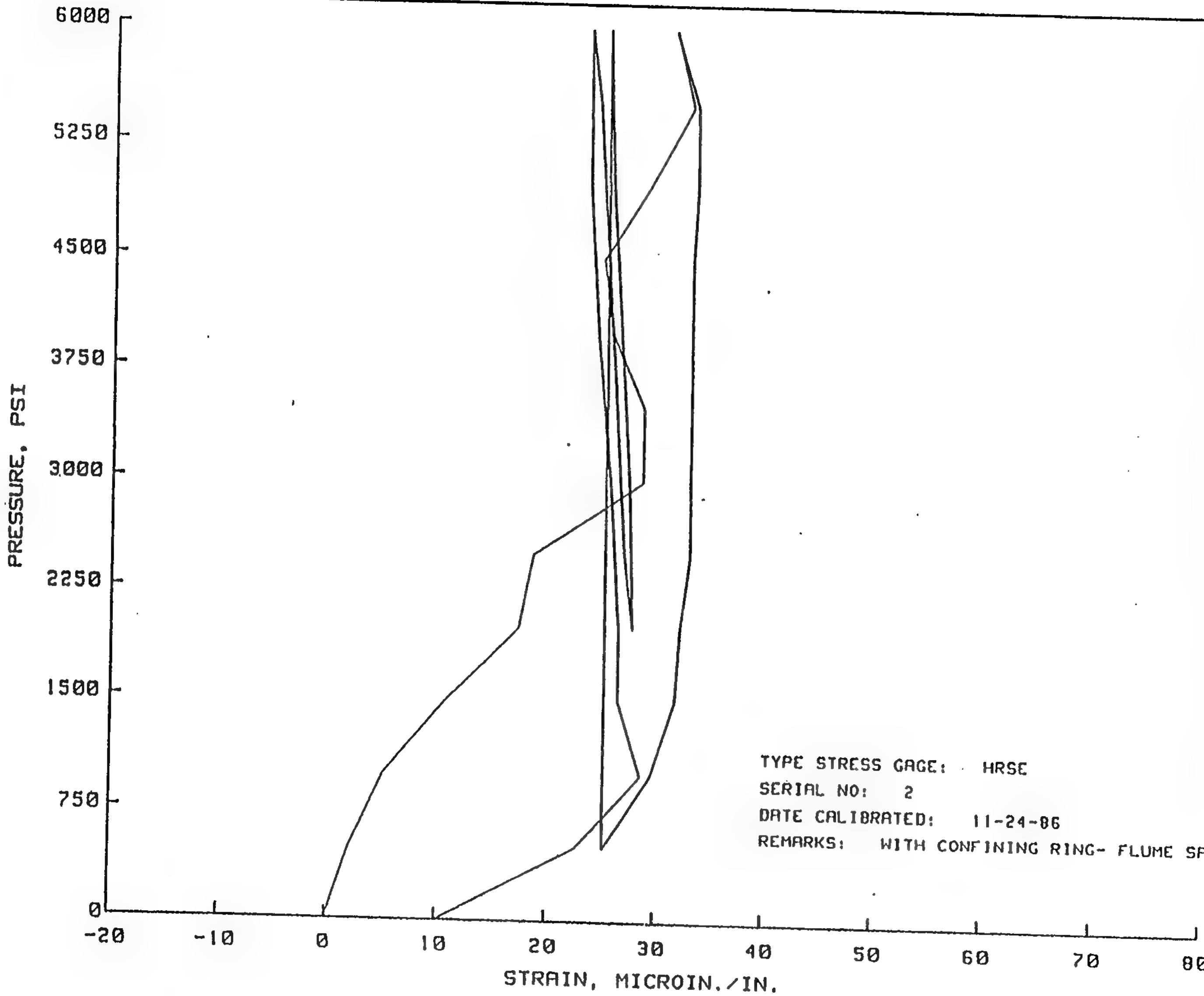
TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-24-06
REMARKS: WITH CONFINING RING- FLUME SAND -TOP CENTER (RUN #1)

Plate 192



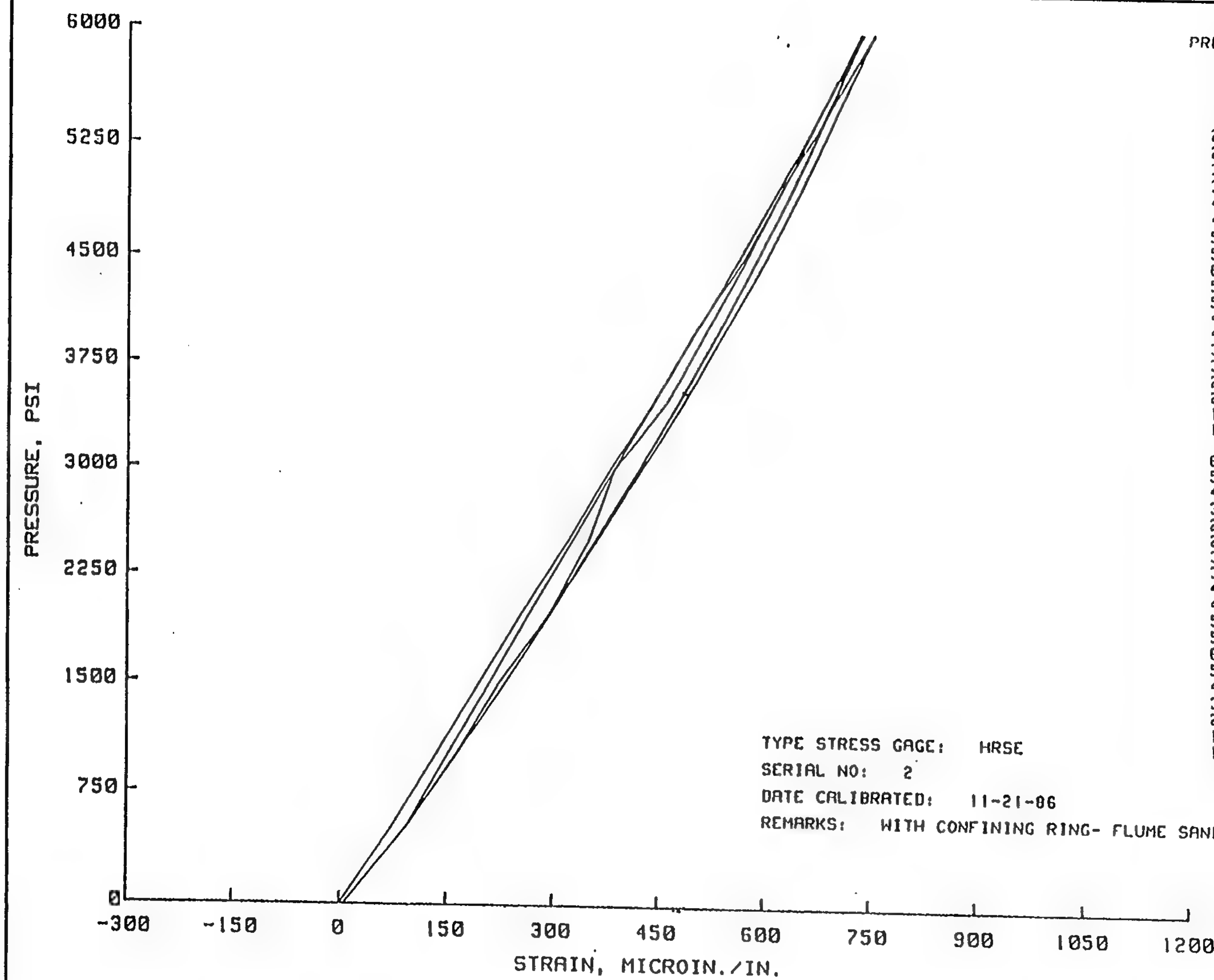
PRESSURE	STRAIN
0	0.0
500	3.5
1000	6.5
1500	10.9
2000	10.4
2500	10.0
3000	12.2
3500	14.0
4000	13.9
4500	8.3
5000	9.6
5500	4.3
6000	2.6
5500	5.7
5000	7.0
4500	9.1
4000	10.9
3500	13.0
3000	15.2
2500	17.4
2000	19.6
1500	21.3
1000	21.3
500	18.7
6000	-5.2
5000	-2.2
4000	3.0
3000	8.7
2000	15.2
2500	11.7
3000	8.7
3500	5.7
4000	2.6
4500	-.4
5000	-3.0
5500	-5.7
6000	-7.4
5000	-3.9
4000	.9
3000	7.0
2000	13.5
1500	16.1
1000	17.4
500	15.7
0	4.3

TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-24-86
REMARKS: WITH CONFINING RING - FLUME SAND - BOTTOM EDGE (RUN #1)



PRESSURE	STRAIN
0	0.0
500	2.2
1000	5.2
1500	10.9
2000	17.4
2500	18.7
3000	28.7
3500	28.7
4000	25.7
4500	24.8
5000	29.1
5500	33.0
6000	31.3
5500	33.5
5000	33.5
4500	33.0
4000	33.0
3500	33.0
3000	33.0
2500	33.0
2000	32.2
1500	31.7
1000	29.6
500	25.2
6000	25.2
5000	25.7
4000	26.5
3000	27.4
2000	27.8
2500	27.0
3000	26.5
3500	26.1
4000	25.7
4500	25.2
5000	24.8
5500	24.3
6000	23.5
5000	23.5
4000	24.3
3000	25.7
2000	26.5
1500	26.5
1000	28.7
500	22.6
0	10.0

Plate 194



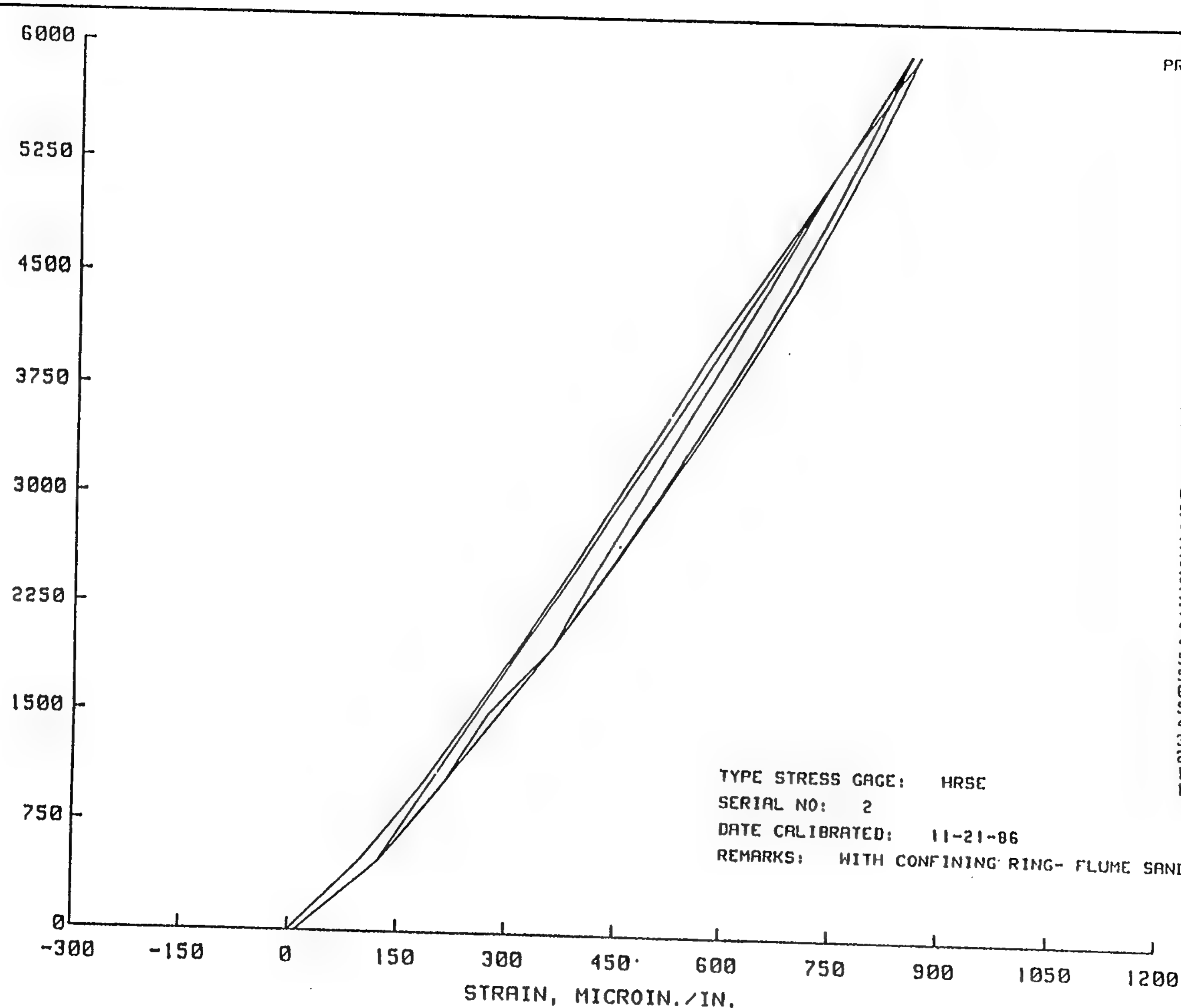
PRESSURE	STRAIN
0	0.0
500	71.3
1000	134.0
1500	195.7
2000	250.3
2500	322.2
3000	381.7
3500	444.8
4000	503.5
4500	570.9
5000	627.0
5500	693.0
6000	756.5
5500	704.3
5000	654.8
4500	602.2
4000	548.2
3500	487.0
3000	426.5
2500	363.0
2000	299.1
1500	231.7
1000	163.0
500	91.7
6000	740.9
5000	643.0
4000	536.5
3000	421.7
2000	297.4
2500	351.3
3000	387.8
3500	463.9
4000	519.6
4500	574.8
5000	629.1
5500	681.7
6000	737.4
5000	641.7
4000	537.0
3000	422.6
2000	297.8
1500	223.0
1000	161.7
500	90.4
0	4.8

TYPE STRESS GAGE: HRSE

SERIAL NO: 2

DATE CALIBRATED: 11-21-86

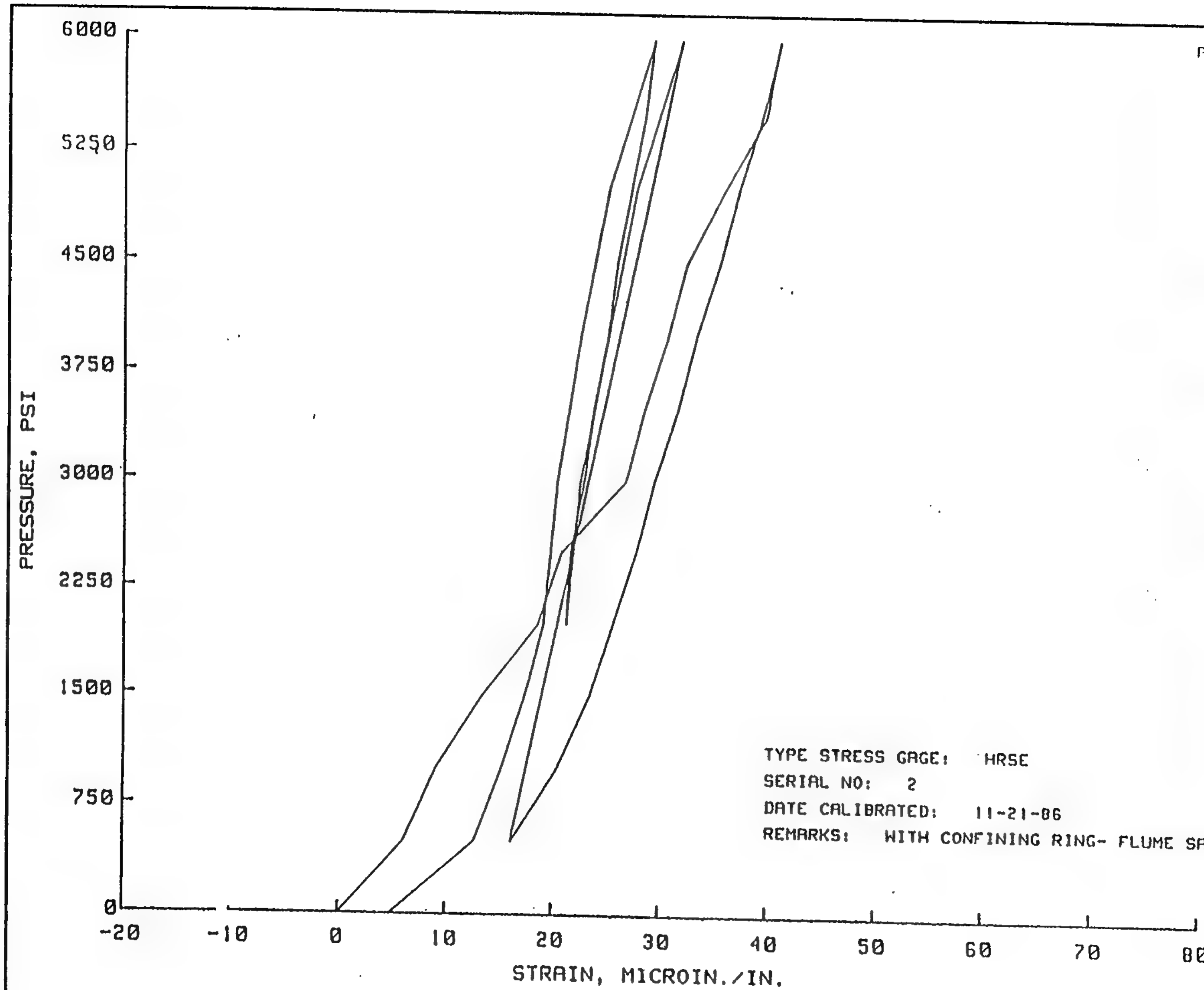
REMARKS: WITH CONFINING RING- FLUME SAND -BOTTOM CENTER (RUN #2)



PRESSURE	STRAIN
0	0.0
500	100.0
1000	181.3
1500	251.7
2000	320.0
2500	384.3
3000	449.1
3500	513.0
4000	576.5
4500	647.8
5000	720.0
5500	792.2
6000	866.1
5500	813.9
5000	760.0
4500	702.2
4000	639.6
3500	575.7
3000	508.7
2500	437.8
2000	365.2
1500	287.8
1000	208.3
500	124.3
6000	855.2
5000	750.4
4000	633.0
3000	505.2
2000	364.3
2500	420.0
3000	482.6
3500	541.7
4000	603.9
4500	664.3
5000	725.7
5500	787.4
6000	852.6
5000	748.7
4000	633.0
3000	507.0
2000	366.1
1500	272.6
1000	209.1
500	126.1
0	9.1

TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-21-86
REMARKS: WITH CONFINING RING- FLUME SAND -TOP CENTER (RUN #2)

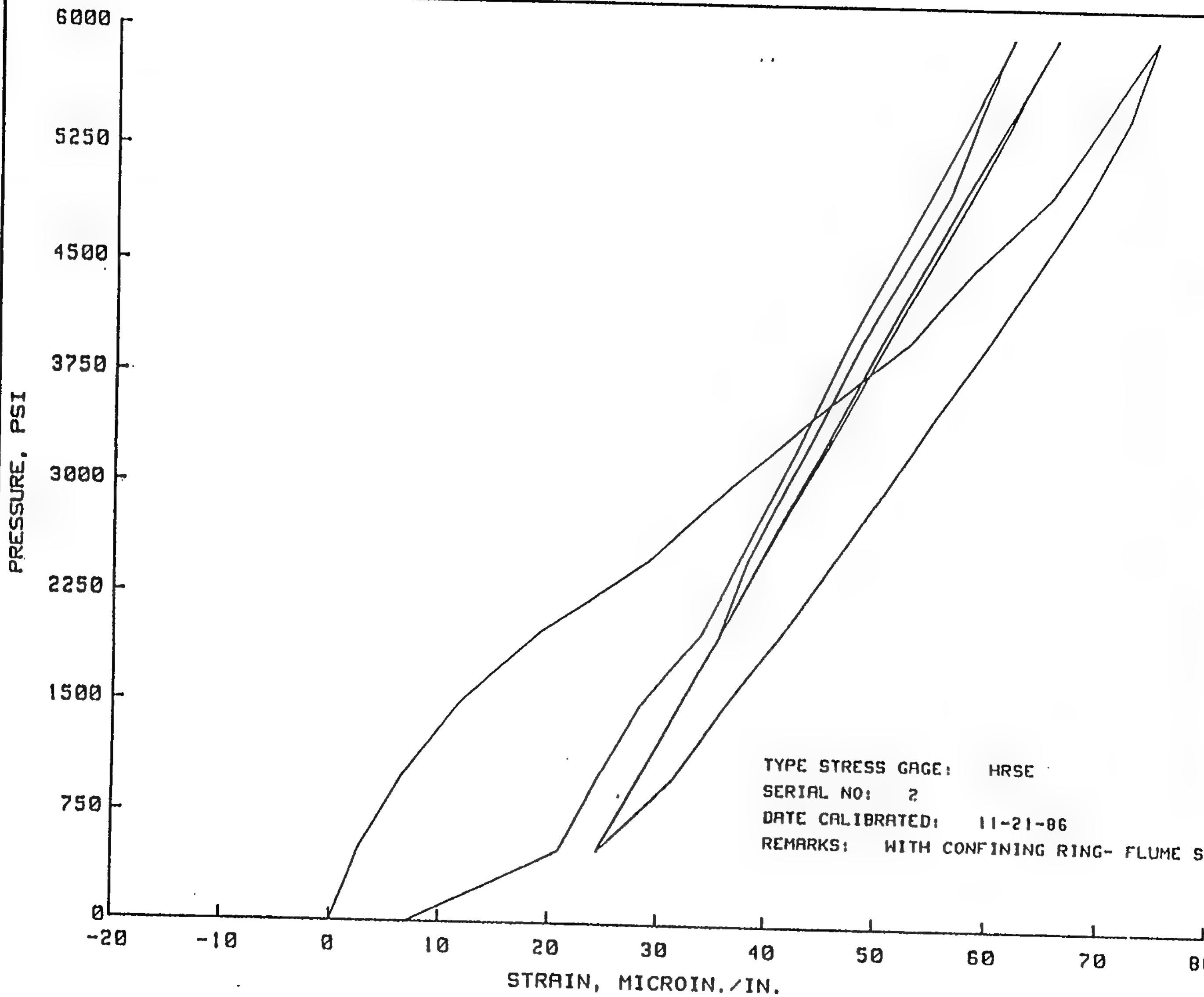
Plate 196



TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-21-86
REMARKS: WITH CONFINING RING- FLUME SAND -BOTTOM EDGE (RUN #2)

PRESSURE	STRAIN
0	0.0
500	6.1
1000	9.1
1500	13.5
2000	18.7
2500	20.9
3000	27.0
3500	28.7
4000	30.9
4500	32.6
5000	36.1
5500	40.0
6000	41.3
5500	39.6
5000	37.4
4500	35.7
4000	33.5
3500	31.7
3000	29.6
2500	27.8
2000	25.7
1500	23.5
1000	20.4
500	16.1
6000	32.2
5000	27.8
4000	25.2
3000	22.6
2000	21.3
2500	21.7
3000	23.8
3500	23.9
4000	25.2
4500	26.1
5000	27.4
5500	28.7
6000	29.6
5000	25.2
4000	22.6
3000	20.4
2000	19.1
1500	17.4
1000	15.2
500	12.6
0	4.8

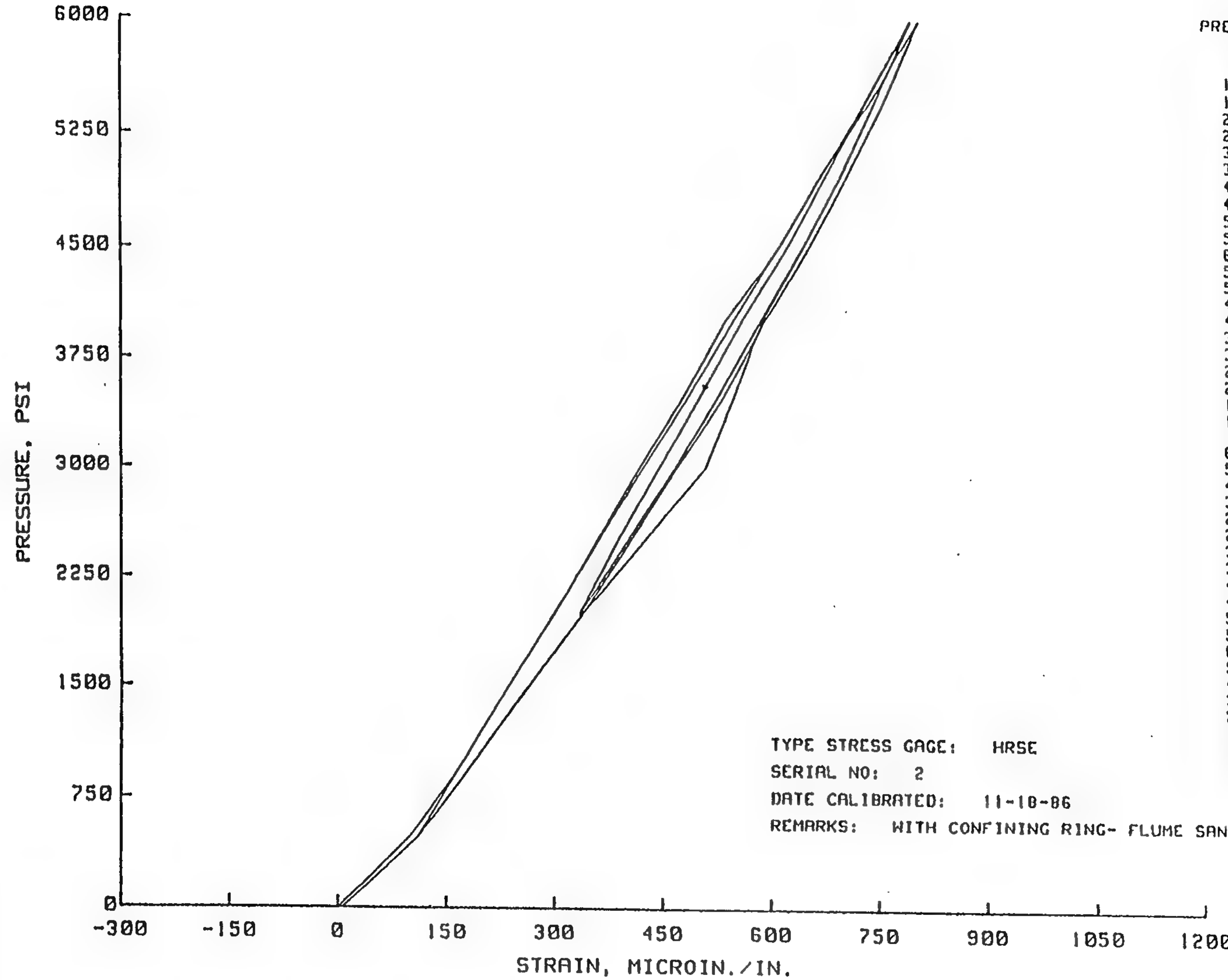
Plate 197



PRESSURE	STRAIN
0	0.0,
500	2.6
1000	6.5
1500	11.7
2000	19.1
2500	29.1
3000	36.5
3500	44.3
4000	53.0
4500	58.7
5000	65.7
5500	70.4
6000	75.2
5500	72.6
5000	68.7
4500	64.3
4000	60.0
3500	55.2
3000	50.9
2500	46.1
2000	41.3
1500	36.1
1000	31.3
500	24.3
6000	66.1
5000	57.8
4000	50.4
3000	43.0
2000	35.7
2500	38.3
3000	41.7
3500	45.2
4000	48.7
4500	52.6
5000	56.5
5500	59.1
6000	62.2
5000	54.8
4000	47.4
3000	40.9
2000	33.9
1500	28.3
1000	24.3
500	20.9
0	7.0

TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-21-86
REMARKS: WITH CONFINING RING- FLUME SAND -TOP EDGE (RUN #2)

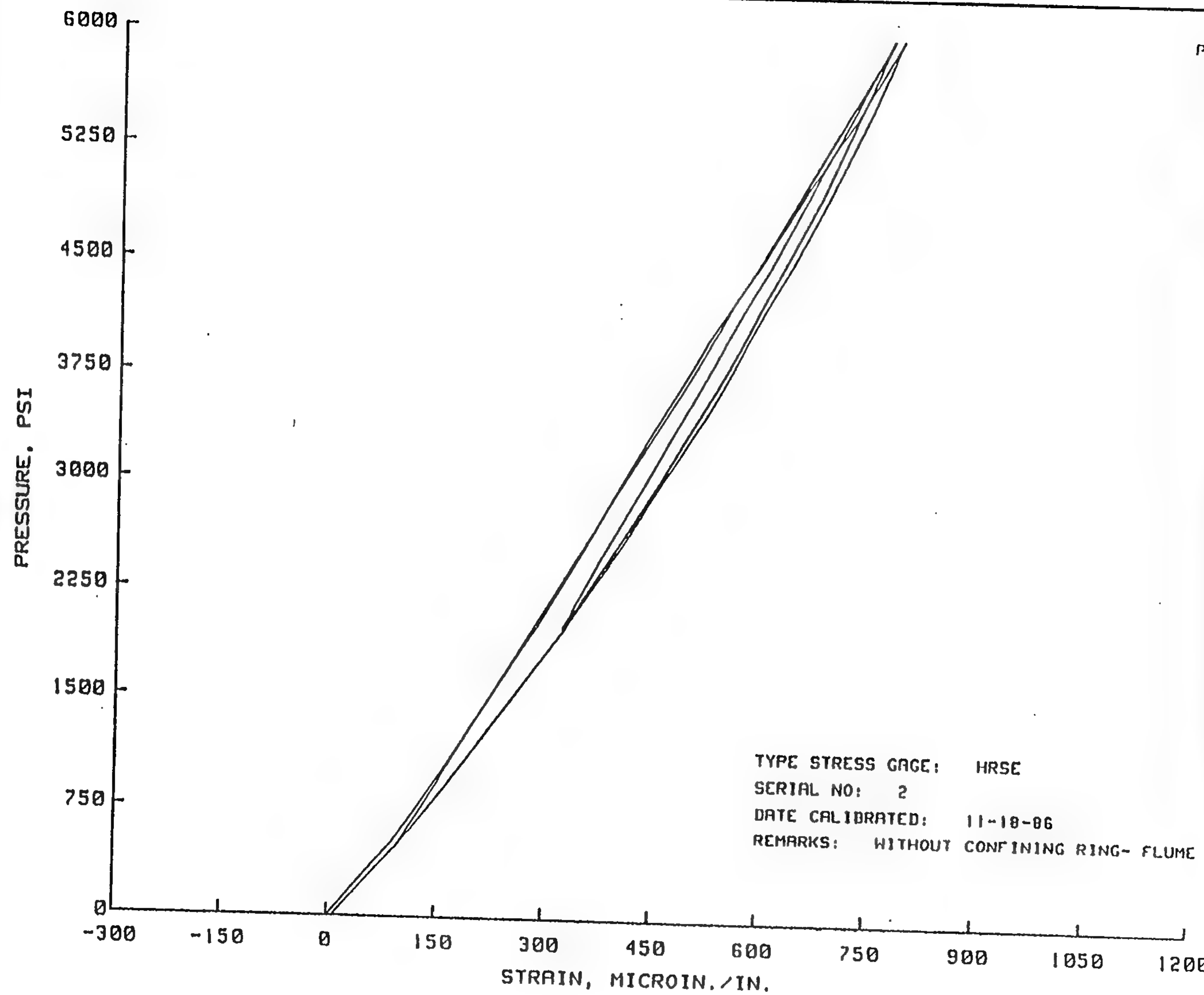
Plate 198



TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-10-86
REMARKS: WITH CONFINING RING- FLUME SAND -BOTTOM CENTER (RUN #3)

PRESSURE	STRAIN
0	0.0.
500	101.7
1000	175.2
1500	237.0
2000	301.3
2500	358.7
3000	419.1
3500	479.6
4000	537.8
4500	611.3
5000	672.2
5500	743.0
6000	808.3
5500	761.3
5000	708.3
4500	651.7
4000	591.7
3500	534.8
3000	470.4
2500	405.2
2000	338.3
1500	263.0
1000	190.0
500	111.7
6000	797.8
5000	699.6
4000	585.7
3000	467.4
2000	334.3
2500	387.8
3000	446.5
3500	502.6
4000	560.9
4500	622.6
5000	679.1
5500	737.4
6000	796.1
5000	699.6
4000	588.7
3000	509.6
2000	338.3
1500	265.2
1000	189.6
500	113.0
0	4.8

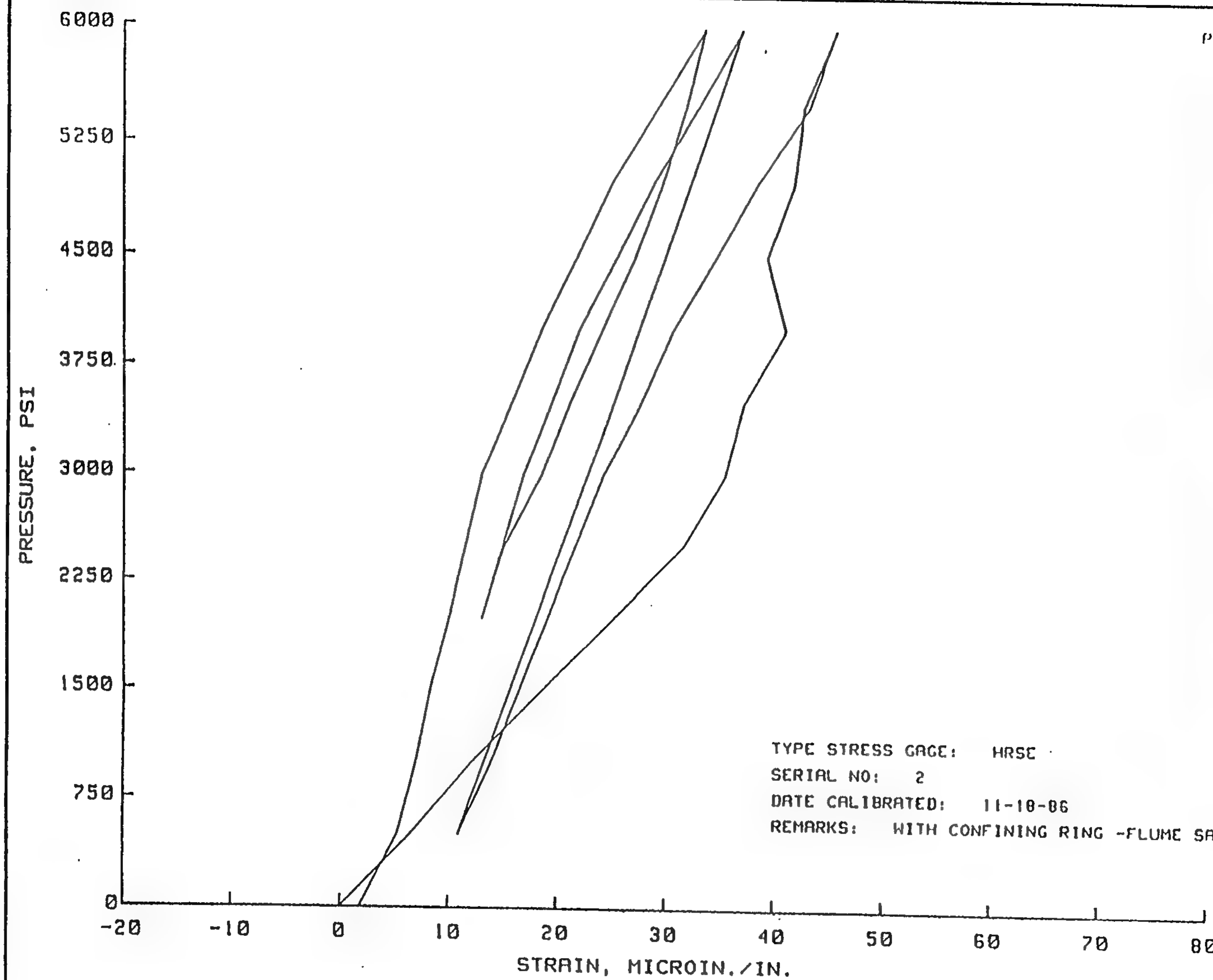
Plate 199



PRESSURE	STRAIN
0	0.0,
500	87.8
1000	157.0
1500	222.6
2000	288.7
2500	349.6
3000	405.7
3500	465.2
4000	527.0
4500	597.8
5000	661.3
5500	732.6
6000	794.3
5500	747.8
5000	696.1
4500	640.9
4000	581.7
3500	525.7
3000	461.3
2500	396.5
2000	328.7
1500	252.6
1000	177.4
500	97.4
6000	781.3
5000	686.1
4000	574.8
3000	458.3
2000	324.3
2500	379.6
3000	438.7
3500	495.2
4000	552.6
4500	613.0
5000	668.3
5500	724.3
6000	788.0
5000	685.7
4000	577.4
3000	456.5
2000	327.8
1500	253.9
1000	176.1
500	97.0
0	5.7

TYPE STRESS GAGE: HRSE
SERIAL NO: 2
DATE CALIBRATED: 11-18-86
REMARKS: WITHOUT CONFINING RING- FLUME SAND -TOP CENTER (RUN #3)

Plate 200



PRESSURE	STRAIN
0	0.0
500	6.5
1000	12.2
1500	18.7
2000	25.2
2500	31.7
3000	35.7
3500	37.4
4000	41.3
4500	39.6
5000	42.2
5500	43.0
6000	46.1
5500	43.5
5000	38.7
4500	34.0
4000	30.9
3500	27.8
3000	24.3
2500	21.7
2000	19.1
1500	16.5
1000	13.9
500	10.9
6000	37.4
5000	29.1
4000	22.2
3000	17.0
2000	13.0
2500	15.2
3000	18.7
3500	21.3
4000	24.3
4500	27.4
5000	30.0
5500	32.2
6000	33.9
5000	25.2
4000	18.7
3000	13.0
2000	10.0
1500	8.3
1000	7.0
500	5.2
0	1.7

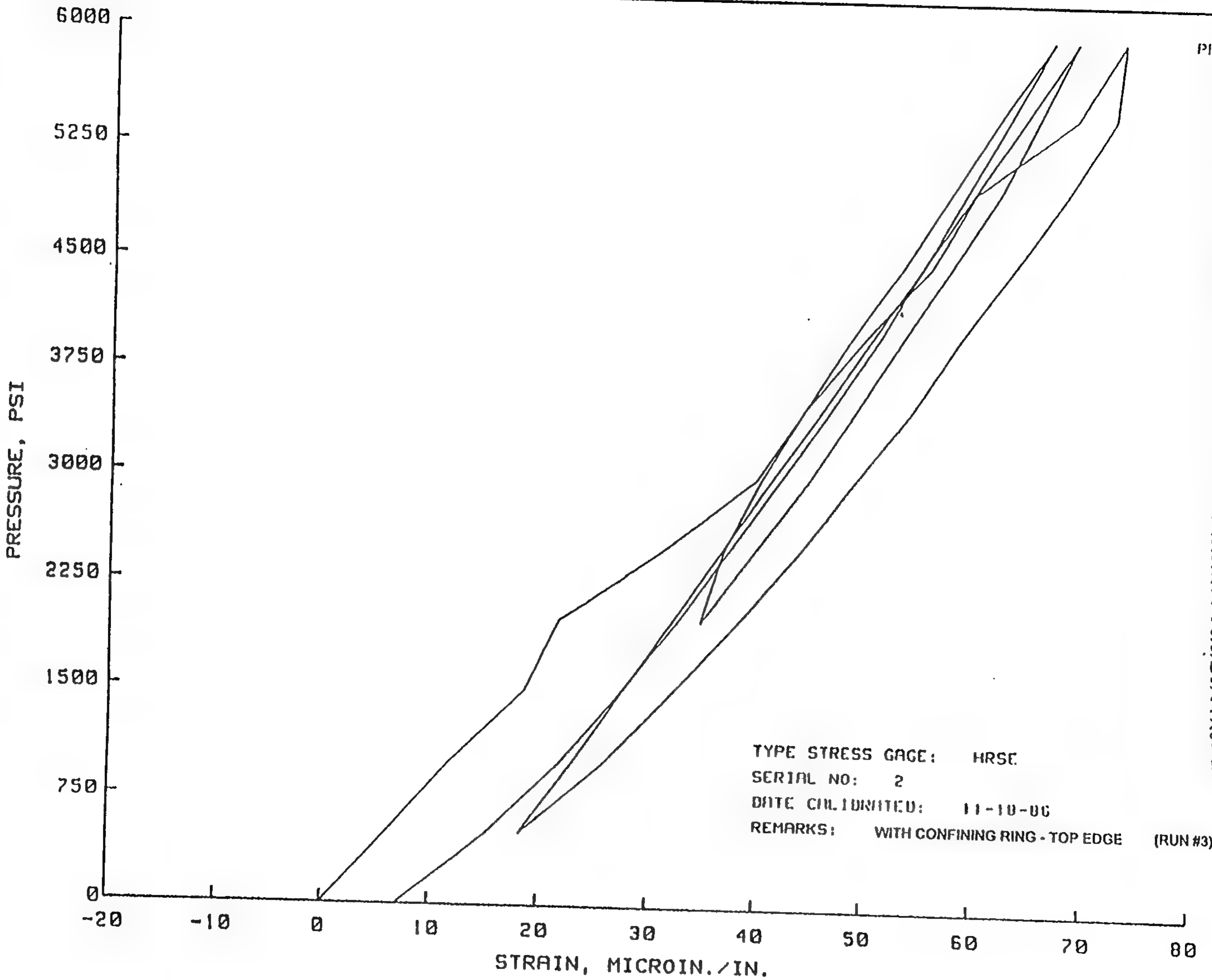
TYPE STRESS GAGE: HRSE

SERIAL NO: 2

DATE CALIBRATED: 11-10-86

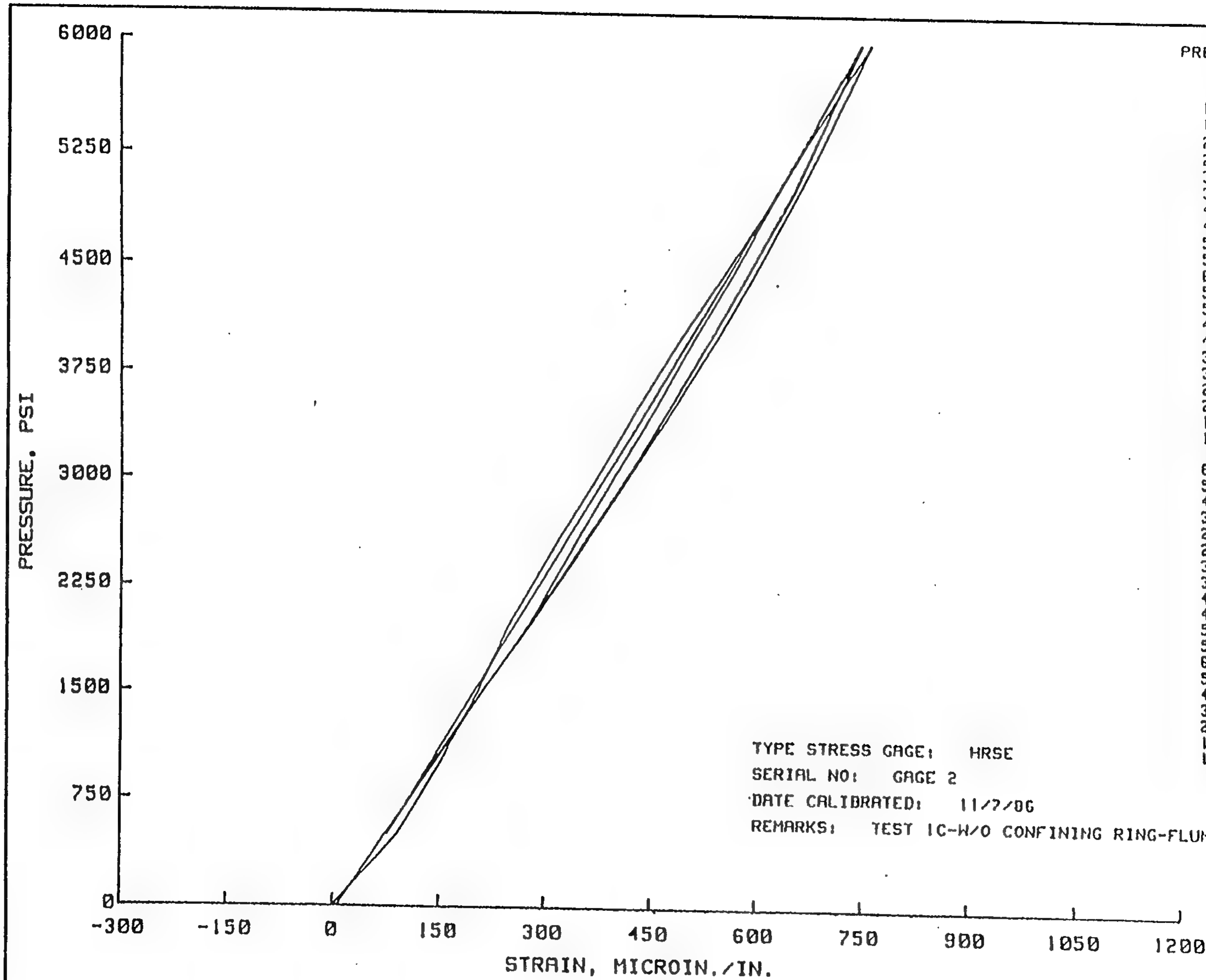
REMARKS: WITH CONFINING RING -FLUME SAND - BOTTOM EDGE (RUN #3)

Plate 201



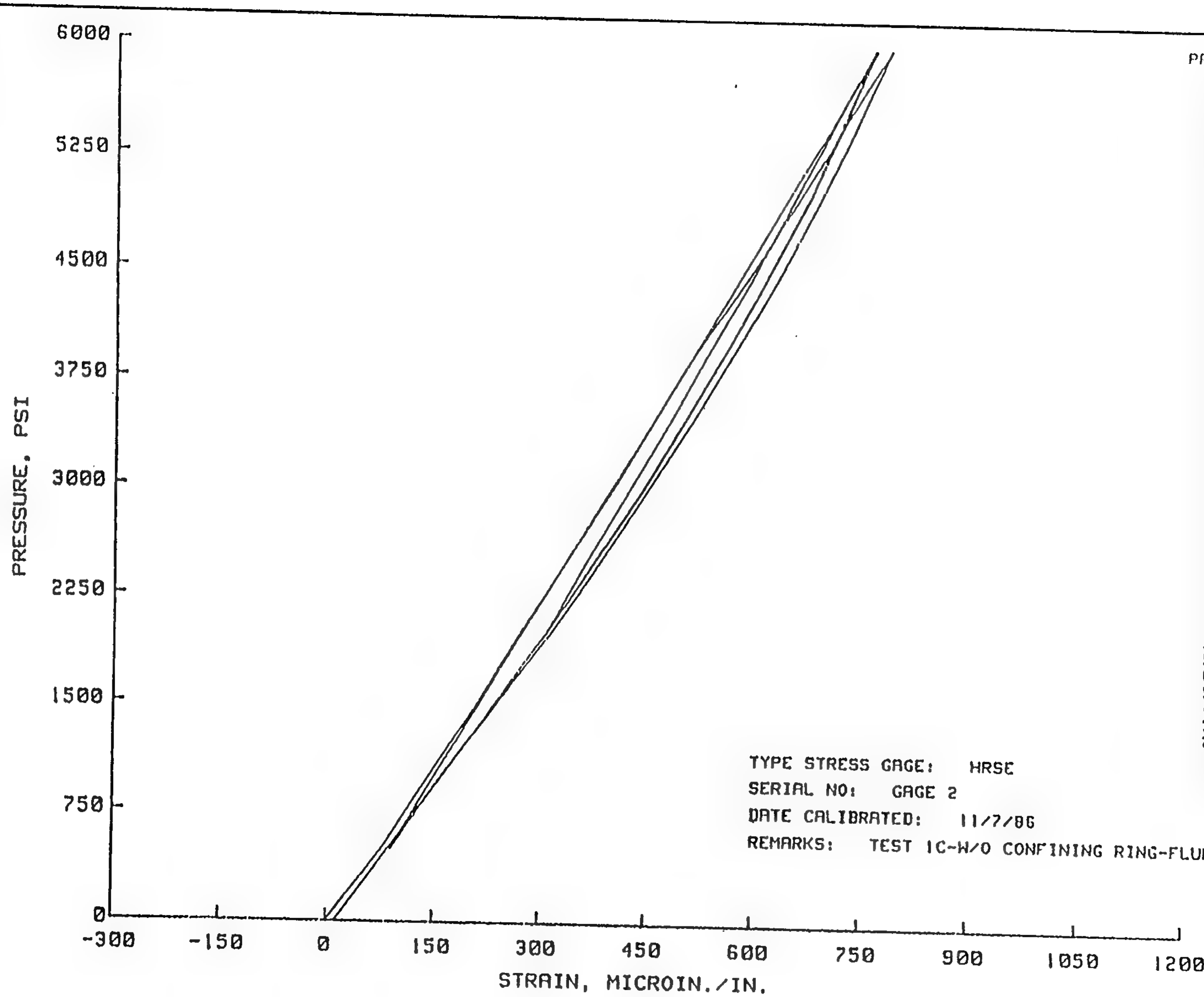
PRESSURE	STRAIN
0	0.0
500	6.1
1000	11.7
1500	18.7
2000	21.7
2500	31.3
3000	40.0
3500	44.3
4000	50.0
4500	56.1
5000	60.0
5500	69.1
6000	73.5
5500	72.6
5000	68.3
4500	63.5
4000	58.7
3500	54.3
3000	49.1
2500	43.9
2000	38.3
1500	32.2
1000	25.7
500	18.3
6000	69.1
5000	62.2
4000	53.5
3000	44.8
2000	34.8
2500	37.0
3000	40.4
3500	44.3
4000	48.7
4500	53.5
5000	57.8
5500	62.2
6000	67.0
5000	59.1
4000	51.3
3000	42.2
2000	32.6
1500	27.4
1000	21.7
500	15.2
0	7.0

Plate 202



PRESSURE	STRAIN
0	0.0
500	90.0
1000	151.3
1500	204.3
2000	251.3
2500	309.6
3000	371.7
3500	429.1
4000	493.0
4500	561.3
5000	629.1
5500	694.0
6000	763.9
5500	711.7
5000	658.7
4500	602.6
4000	543.9
3500	479.6
3000	414.0
2500	349.1
2000	202.6
1500	209.1
1000	139.6
500	75.7
6000	750.9
5000	652.6
4000	535.2
3000	413.0
2000	279.6
2500	336.5
3000	395.2
3500	454.0
4000	512.6
4500	573.0
5000	630.4
5500	689.6
6000	749.6
5000	650.0
4000	535.2
3000	412.2
2000	200.0
1500	209.6
1000	143.0
500	72.2
0	5.7

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/7/06
REMARKS: TEST 1C-W/O CONFINING RING-FLUME SAND-BOTTOM CENTER



PRESSURE	STRAIN
0	9.0
500	76.5
1000	143.5
1500	210.0
2000	270.9
2500	337.0
3000	400.9
3500	460.9
4000	523.0
4500	593.9
5000	660.4
5500	723.5
6000	700.7
5500	740.0
5000	689.1
4500	634.8
4000	575.2
3500	514.3
3000	450.0
2500	383.5
2000	314.3
1500	236.5
1000	160.9
500	89.1
6000	767.8
5000	675.2
4000	563.0
3000	443.5
2000	307.8
2500	364.0
3000	424.3
3500	483.9
4000	540.0
4500	599.1
5000	653.9
5500	709.1
6000	764.8
5000	672.2
4000	562.6
3000	441.7
2000	307.8
1500	233.5
1000	161.7
500	84.3
0	11.7

Plate 204

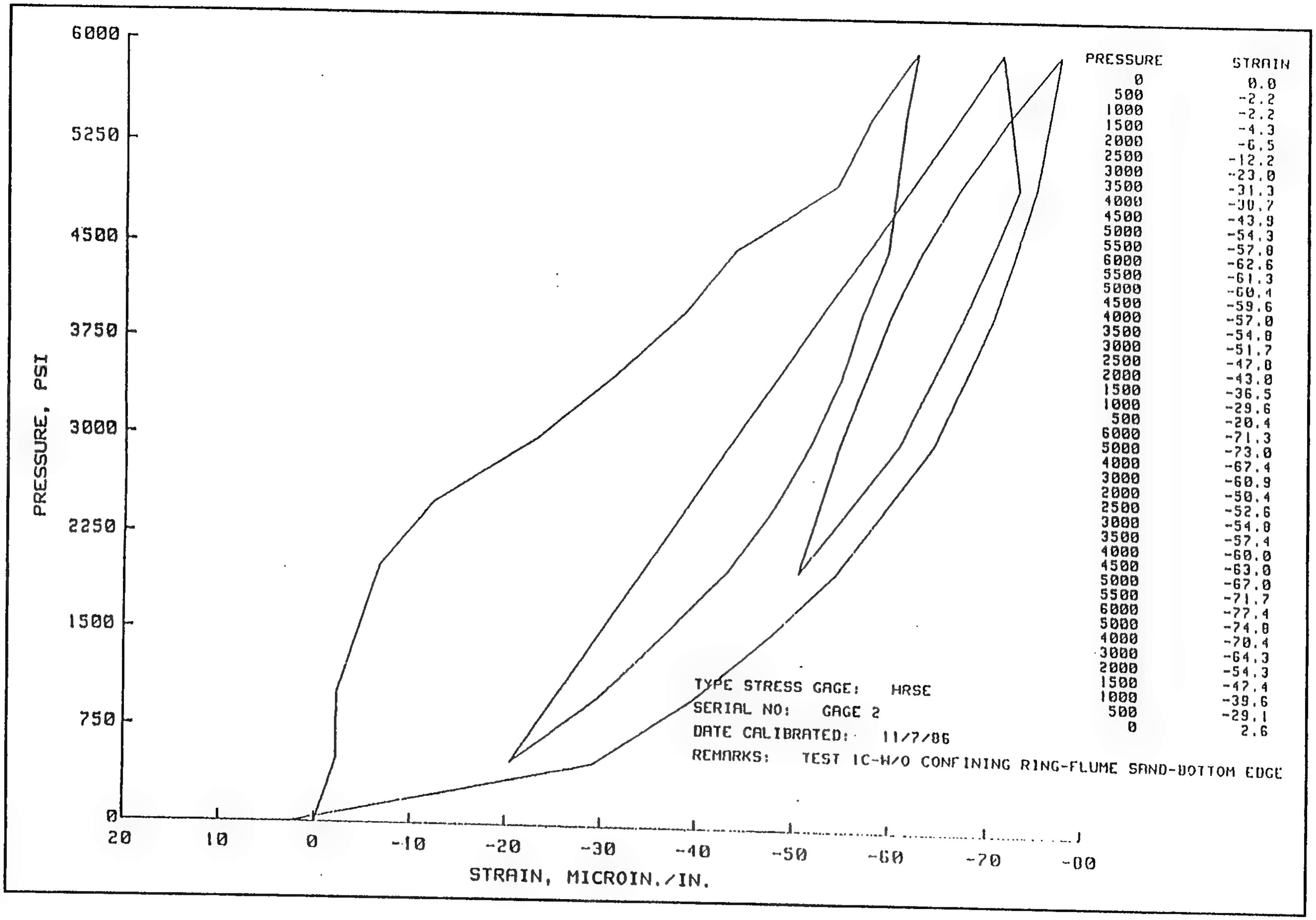
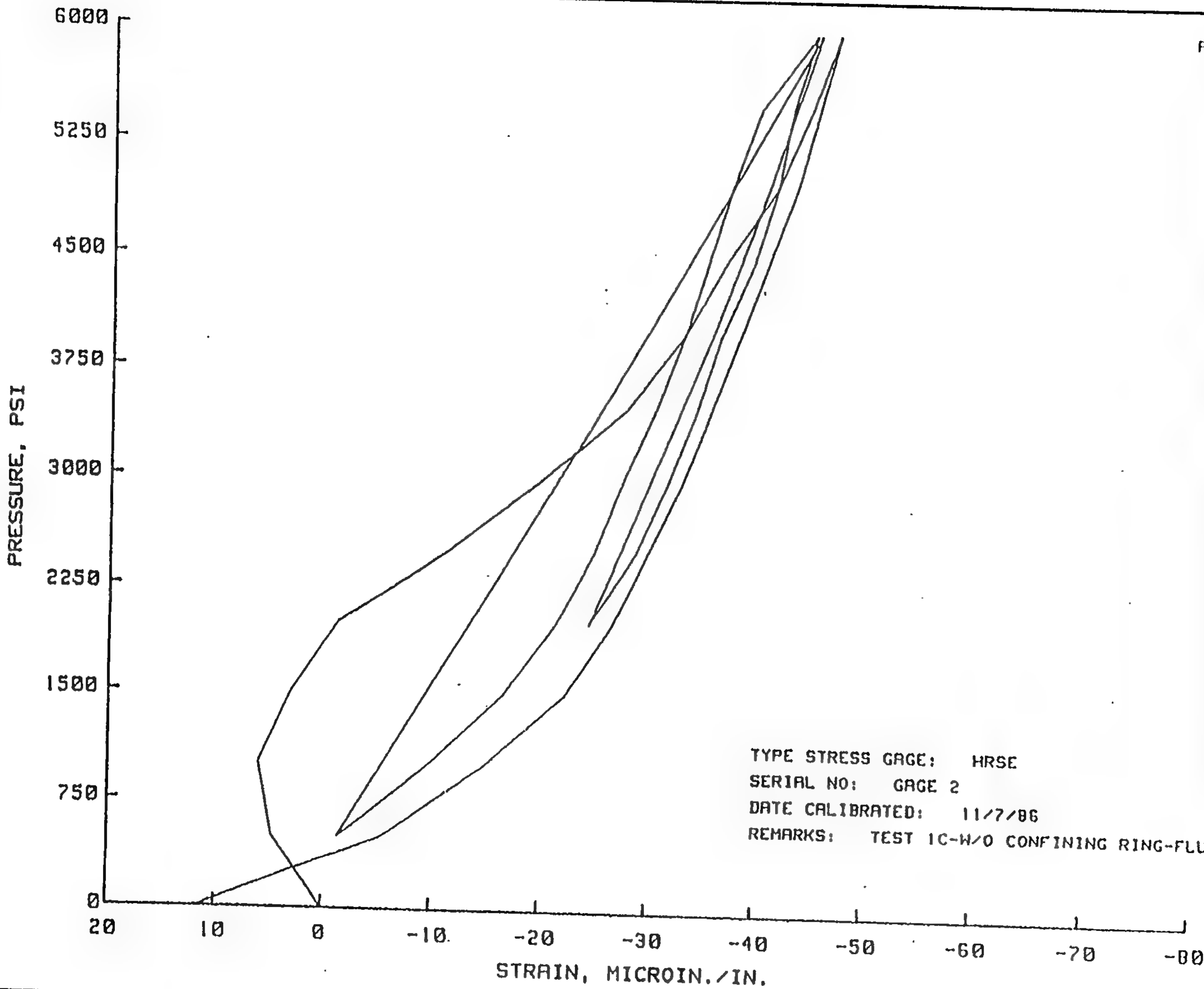

PRESSURE, PSI
6000
5250
4500
3750
3000
2250
1500
750
0
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
STRAIN, MICROIN./IN.
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/7/86
REMARKS: TEST 1C-W/O CONFINING RING-FLUME SAND-BOTTOM EDGE
PRESSURE STRAIN
0 0.0
500 -2.2
1000 -2.2
1500 -4.3
2000 -6.5
2500 -12.2
3000 -23.0
3500 -31.3
4000 -38.7
4500 -43.9
5000 -54.3
5500 -57.8
6000 -62.6
5500 -61.3
5000 -60.4
4500 -59.6
4000 -57.0
3500 -54.8
3000 -51.7
2500 -47.8
2000 -43.0
1500 -36.5
1000 -29.6
500 -20.4
6000 -71.3
5000 -73.0
4000 -67.4
3000 -60.9
2000 -50.4
2500 -52.6
3000 -54.8
3500 -57.4
4000 -60.0
4500 -63.0
5000 -67.0
5500 -71.7
6000 -77.4
5000 -74.8
4000 -70.4
3000 -64.3
2000 -54.3
1500 -47.4
1000 -39.6
500 -29.1
0 2.6

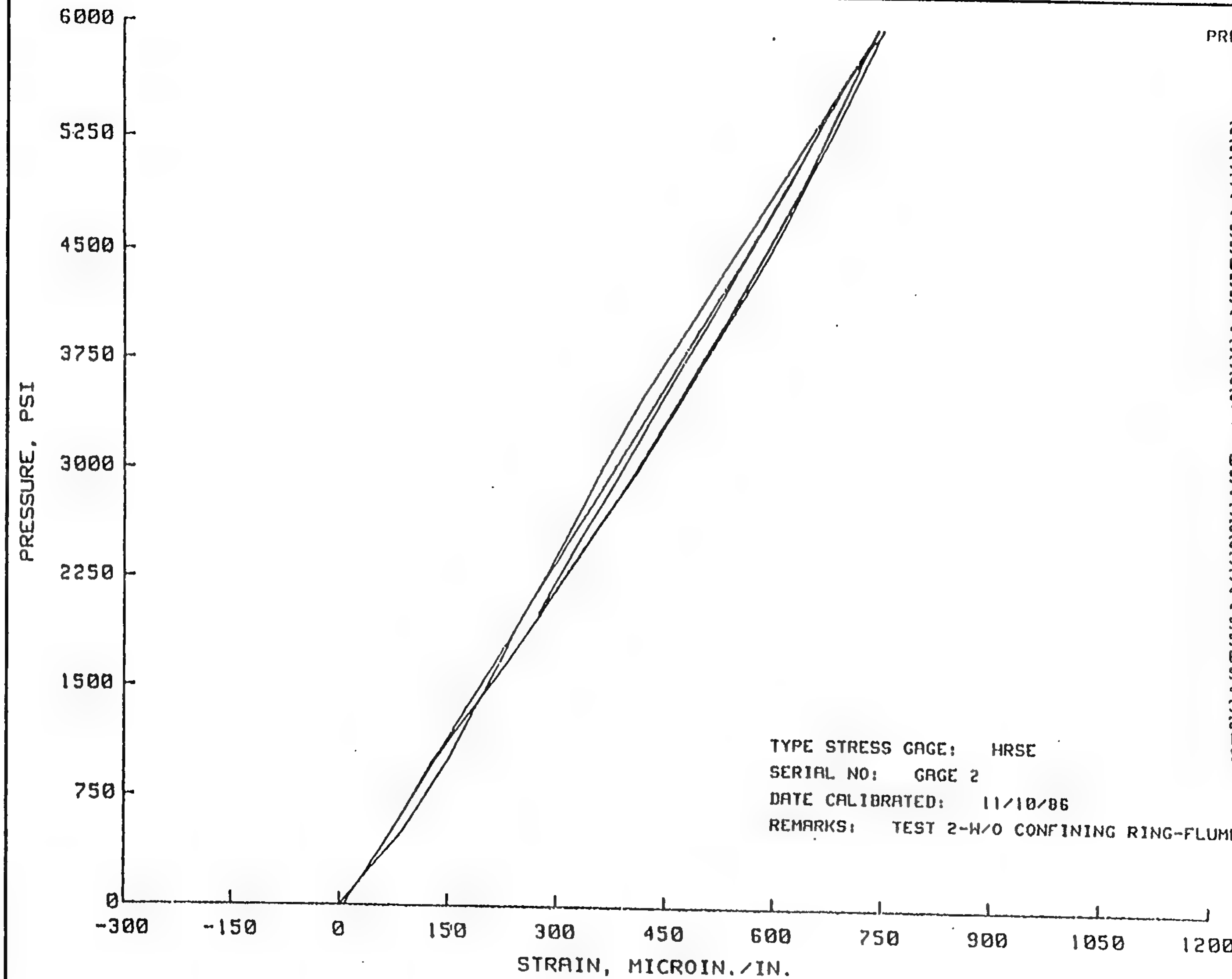
Plate 205



PRESSURE	STRAIN
0	0.0
500	4.0
1000	6.1
1500	3.0
2000	-1.3
2500	-11.3
3000	-20.0
3500	-27.8
4000	-33.0
4500	-37.0
5000	-41.7
5500	-43.0
6000	-45.2
5500	-40.0
5000	-37.4
4500	-35.2
4000	-33.0
3500	-30.4
3000	-27.4
2500	-24.8
2000	-21.3
1500	-16.5
1000	-9.6
500	-1.3
6000	-45.7
5000	-40.9
4000	-35.7
3000	-30.0
2000	-24.3
2500	-20.7
3000	-31.7
3500	-34.3
4000	-36.5
4500	-39.6
5000	-41.7
5500	-44.8
6000	-47.4
5000	-43.5
4000	-38.3
3000	-33.0
2000	-26.5
1500	-22.2
1000	-14.8
500	-5.2
0	11.7

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/7/86
REMARKS: TEST 1C-W/O CONFINING RING-FLUME SAND-TOP EDGE

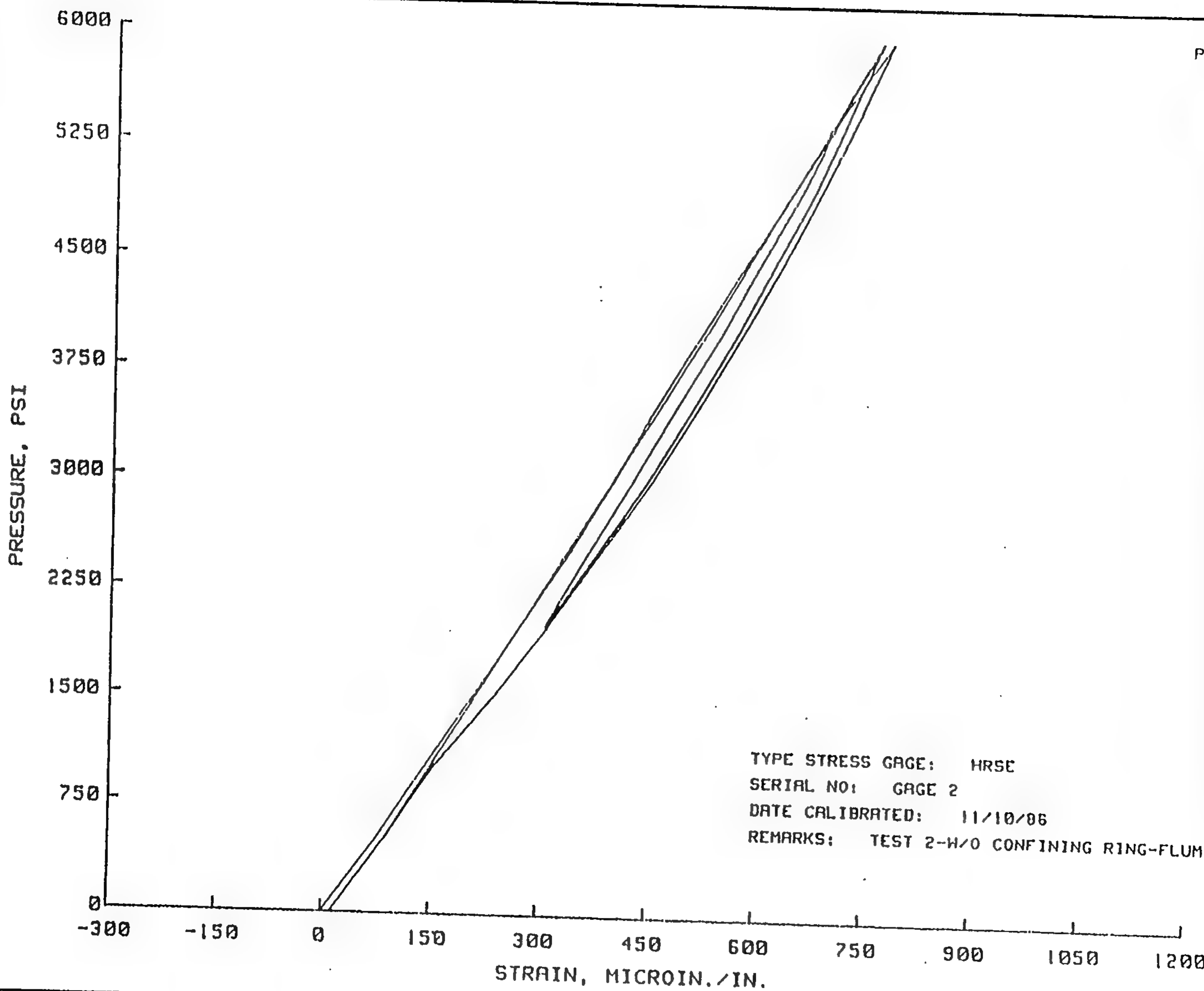
Plate 206



PRESSURE	STRAIN
0	0.0
500	05.2
1000	150.4
1500	203.0
2000	254.0
2500	311.3
3000	361.7
3500	410.3
4000	404.3
4500	547.0
5000	615.7
5500	601.7
6000	756.1
5500	703.9
5000	650.0
4500	594.0
4000	534.8
3500	473.5
3000	411.7
2500	343.0
2000	276.5
1500	206.1
1000	128.7
500	70.0
6000	740.3
5000	645.7
4000	530.0
3000	400.7
2000	273.5
2500	330.4
3000	390.0
3500	447.0
4000	507.0
4500	566.1
5000	627.0
5500	681.7
6000	747.4
5000	646.5
4000	531.3
3000	408.7
2000	270.3
1500	205.2
1000	132.6
500	69.6
0	5.7

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/10/86
REMARKS: TEST 2-W/O CONFINING RING-FLUME SAND-BOTTOM CENTER

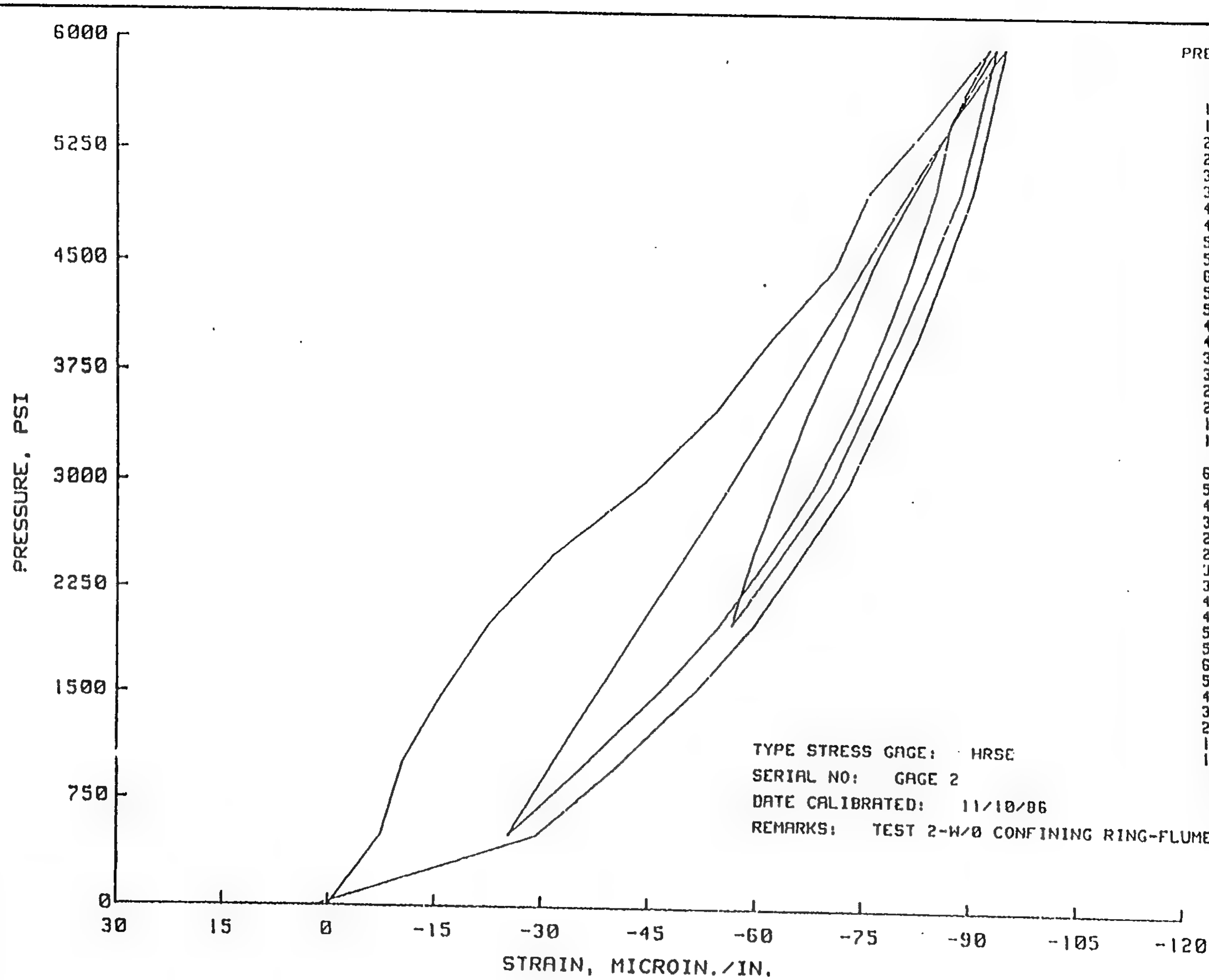
Plate 207



PRESSURE	STRAIN
0	0.0
500	74.3
1000	140.4
1500	206.1
2000	272.6
2500	330.7
3000	397.0
3500	453.0
4000	514.0
4500	570.7
5000	645.7
5500	711.3
6000	783.5
5500	735.2
5000	683.0
4500	629.6
4000	571.3
3500	510.9
3000	449.6
2500	380.0
2000	310.4
1500	235.2
1000	150.4
500	85.7
6000	769.1
5000	673.9
4000	563.5
3000	443.9
2000	305.7
2500	364.3
3000	423.9
3500	481.3
4000	542.6
4500	599.1
5000	657.0
5500	709.1
6000	760.7
5000	673.9
4000	563.9
3000	443.5
2000	310.0
1500	233.0
1000	153.5
500	84.3
0	11.7

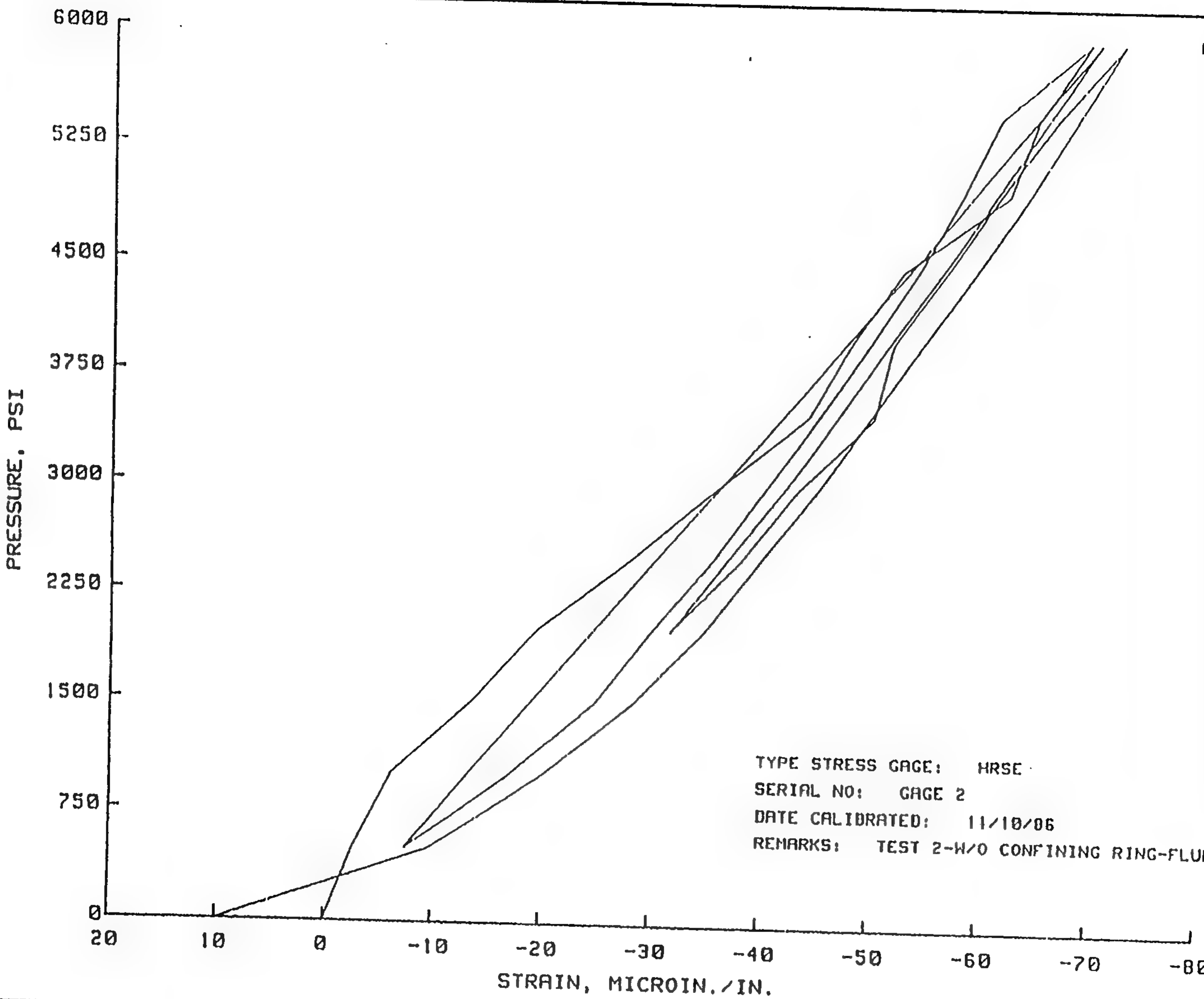
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/10/86
REMARKS: TEST 2-W/O CONFINING RING-FLUME SAND-TOP CENTER

Plate 208



PRESSURE	STRAIN
0	0.0
500	-7.4
1000	-10.4
1500	-16.1
2000	-22.6
2500	-31.7
3000	-44.3
3500	-54.3
4000	-62.2
4500	-71.3
5000	-76.1
5500	-84.0
6000	-93.0
5500	-87.4
5000	-85.2
4500	-81.7
4000	-77.8
3500	-73.5
3000	-68.3
2500	-61.7
2000	-54.0
1500	-46.1
1000	-36.1
500	-25.2
6000	-93.9
5000	-88.7
4000	-80.0
3000	-70.4
2000	-56.5
2500	-59.6
3000	-63.5
3500	-67.4
4000	-72.2
4500	-76.5
5000	-82.2
5500	-87.0
6000	-95.2
5000	-90.4
4000	-82.6
3000	-73.0
2000	-59.6
1500	-50.9
1000	-40.9
500	-29.1
0	1.7

Plate 209



PRESSURE	STRAIN
0	0.0
500	-2.6
1000	-6.1
1500	-13.5
2000	-19.6
2500	-20.3
3000	-36.1
3500	-44.3
4000	-40.3
4500	-53.0
5000	-62.6
5500	-65.2
6000	-70.0
5500	-61.7
5000	-50.3
4500	-54.3
4000	-50.0
3500	-45.2
3000	-40.4
2500	-35.7
2000	-30.0
1500	-24.0
1000	-17.0
500	-7.4
6000	-70.9
5000	-61.3
4000	-51.7
3000	-42.2
2000	-31.7
2500	-38.3
3000	-43.5
3500	-50.4
4000	-52.2
4500	-57.0
5000	-61.7
5500	-87.0
6000	-73.0
5000	-64.3
4000	-54.8
3000	-45.2
2000	-34.8
1500	-28.3
1000	-20.0
500	-9.6
0.	10.0

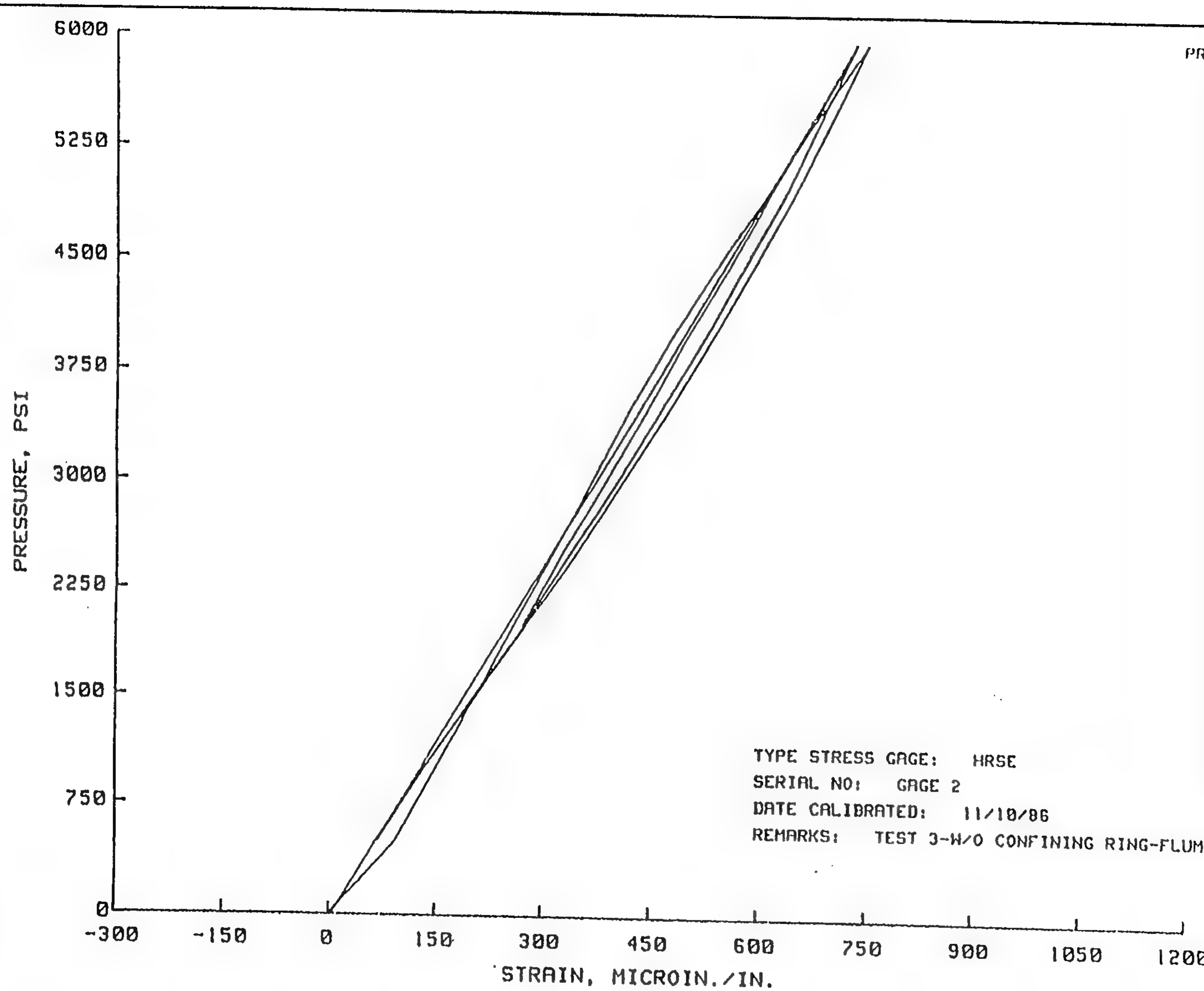
TYPE STRESS GAGE: HRSE

SERIAL NO: GAGE 2

DATE CALIBRATED: 11/10/86

REMARKS: TEST 2-W/O CONFINING RING-FLUME SAND-TOP EDGE

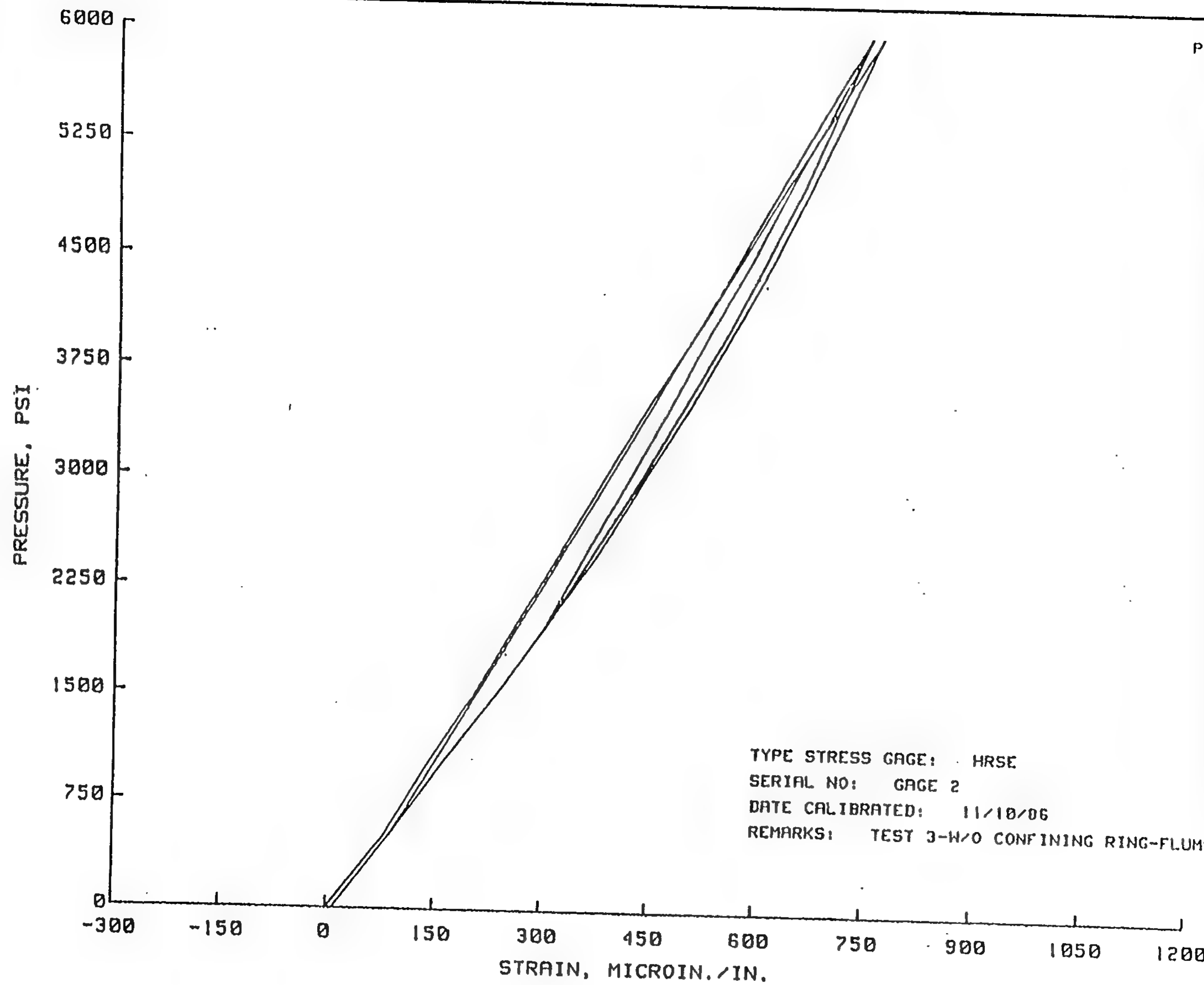
Plate 210



PRESSURE	STRAIN
0	0.0
500	93.0
1000	149.6
1500	205.7
2000	250.7
2500	313.9
3000	366.5
3500	410.7
4000	470.3
4500	544.0
5000	613.9
5500	682.6
6000	753.9
5500	703.0
5000	650.9
4500	594.3
4000	534.0
3500	473.5
3000	407.0
2500	344.0
2000	275.2
1500	204.0
1000	133.0
500	67.4
6000	737.0
5000	639.1
4000	524.3
3000	399.6
2000	271.3
2500	326.5
3000	385.2
3500	443.5
4000	499.1
4500	561.3
5000	618.7
5500	679.6
6000	737.0
5000	637.4
4000	523.5
3000	400.9
2000	272.6
1500	201.7
1000	131.3
500	64.0
0	3.0

TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/10/86
REMARKS: TEST 3-W/O CONFINING RING-FLUME SAND-BOTTOM CENTER

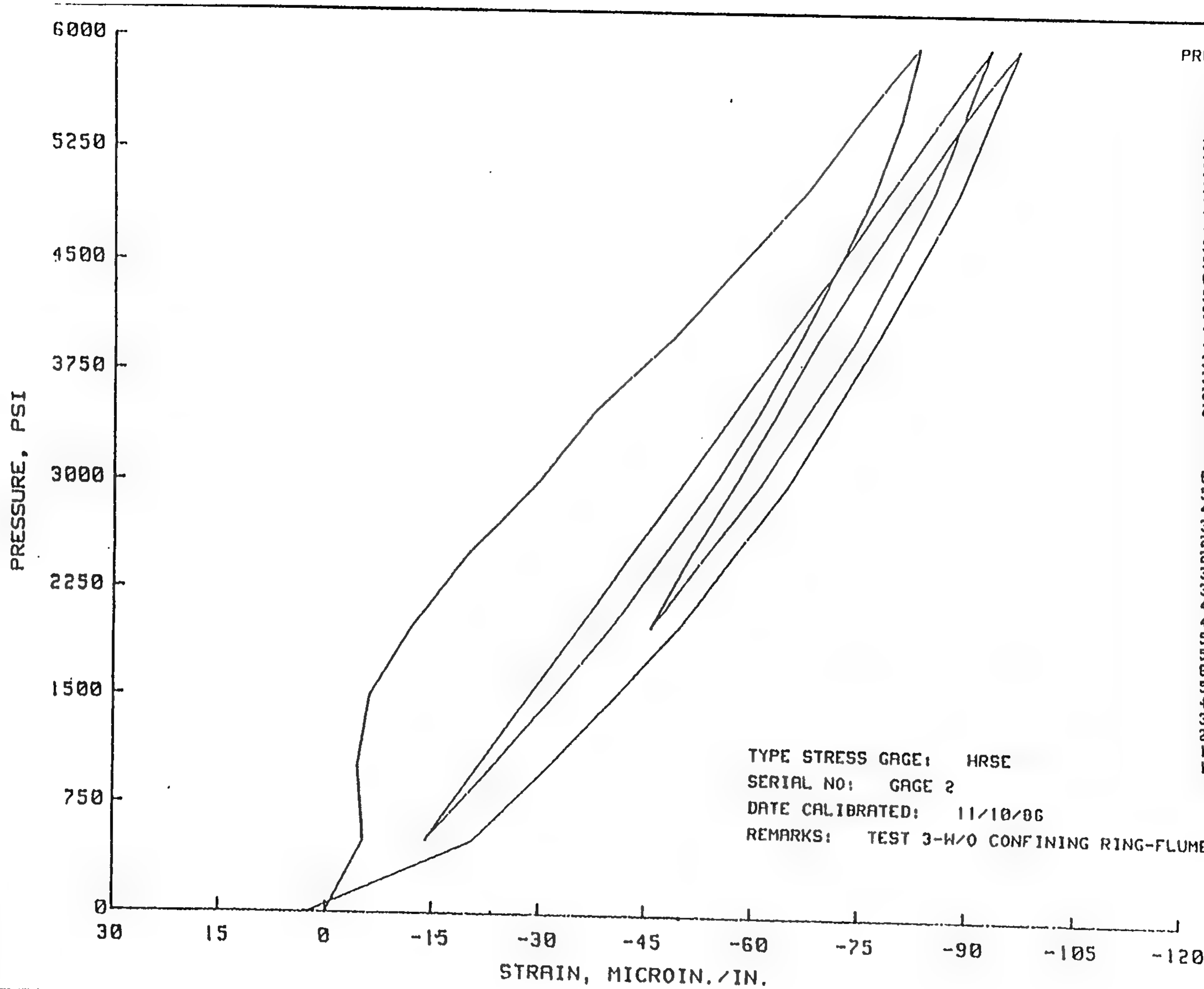
Plate 211



TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/10/06
REMARKS: TEST 3-W/O CONFINING RING-FLUME SAND-TOP CENTER

PRESSURE	STRAIN
0	0.0
500	78.7
1000	137.0
1500	203.5
2000	263.0
2500	323.9
3000	303.5
3500	444.3
4000	511.7
4500	575.2
5000	630.7
5500	707.0
6000	769.1
5500	721.3
5000	672.6
4500	619.6
4000	562.2
3500	503.5
3000	439.6
2500	377.4
2000	306.1
1500	233.5
1000	156.5
500	85.7
6000	753.0
5000	663.0
4000	554.0
3000	433.9
2000	304.8
2500	360.4
3000	418.7
3500	476.5
4000	530.4
4500	590.0
5000	644.0
5500	701.7
6000	754.3
5000	662.6
4000	554.0
3000	435.7
2000	306.5
1500	233.0
1000	157.0
500	84.3
0	7.0

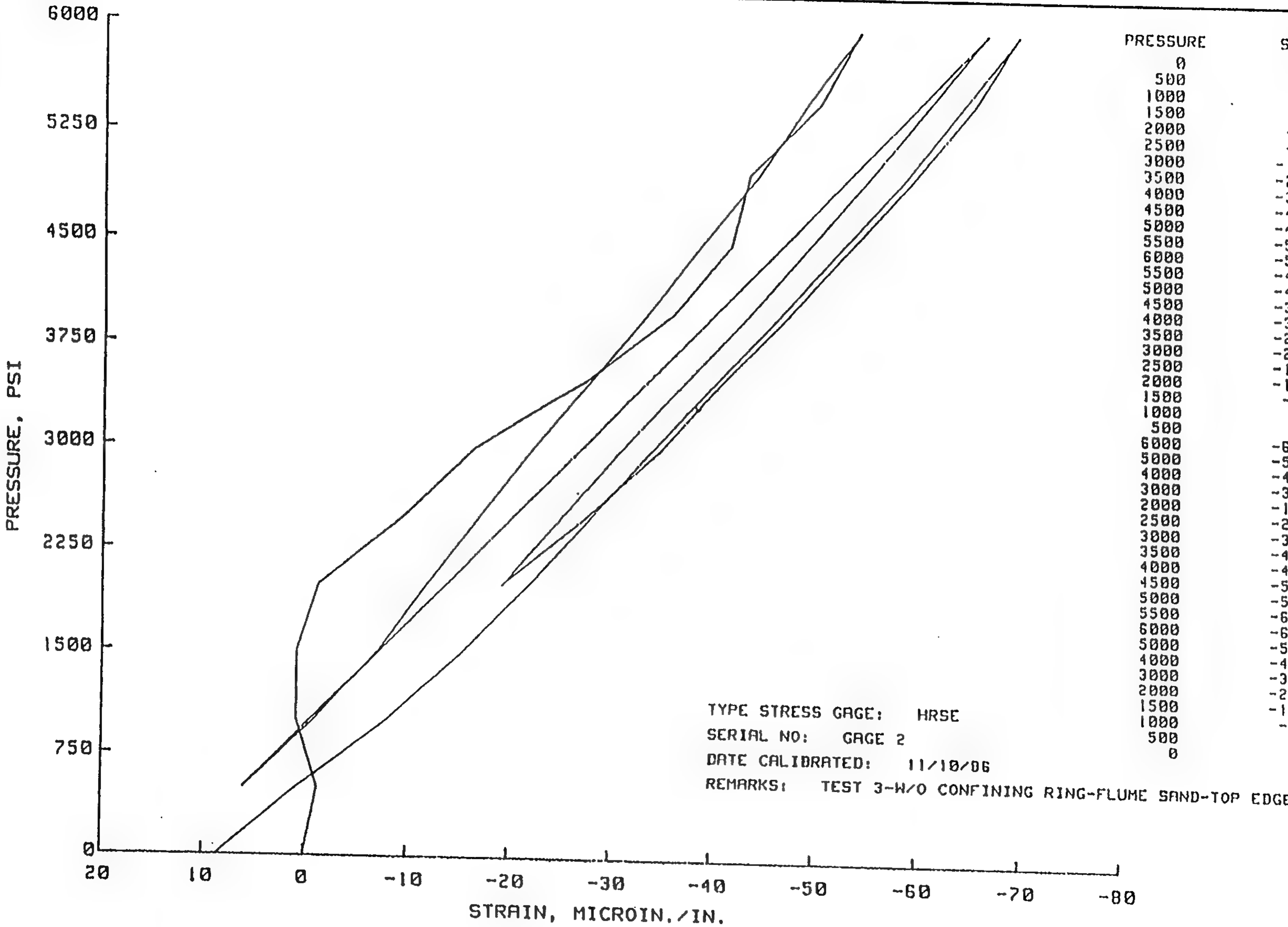
Plate 212



PRESSURE	STRAIN
0	0.0
500	-5.2
1000	-4.3
1500	-6.1
2000	-12.2
2500	-20.0
3000	-29.6
3500	-37.8
4000	-48.7
4500	-57.8
5000	-67.4
5500	-75.2
6000	-83.5
5500	-80.9
5000	-77.0
4500	-71.7
4000	-66.5
3500	-60.9
3000	-54.3
2500	-47.4
2000	-40.0
1500	-31.7
1000	-23.0
500	-13.9
6000	-93.5
5000	-85.2
4000	-74.3
3000	-60.9
2000	-45.7
2500	-51.3
3000	-57.4
3500	-63.5
4000	-69.1
4500	-75.7
5000	-82.6
5500	-89.6
6000	-97.4
5000	-88.7
4000	-77.4
3000	-64.8
2000	-49.6
1500	-40.4
1000	-30.9
500	-20.4
0	2.6

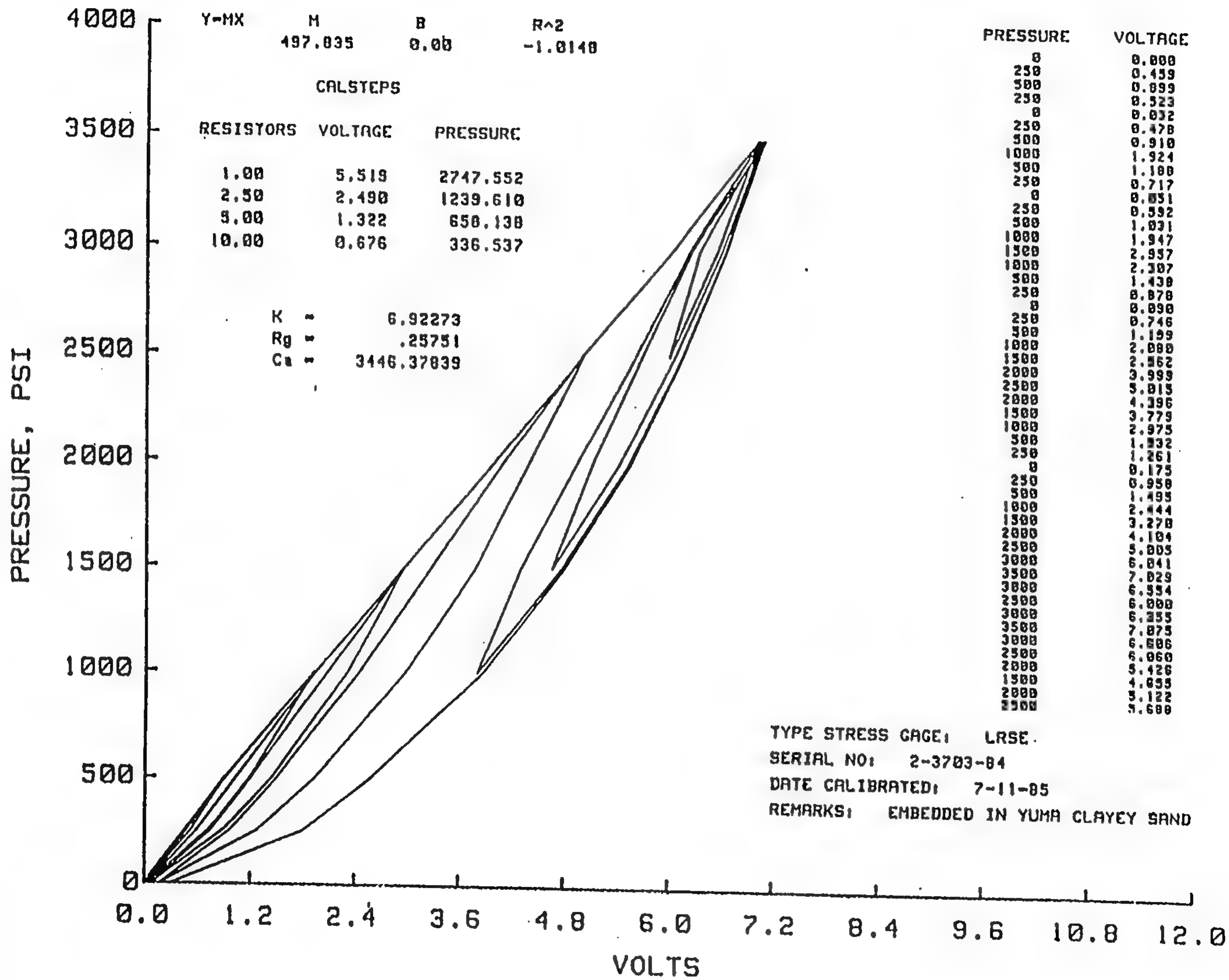
TYPE STRESS GAGE: HRSE
SERIAL NO: GAGE 2
DATE CALIBRATED: 11/10/86
REMARKS: TEST 3-W/O CONFINING RING-FLUME SAND-BOTTOM EDGE

Plate 213



PRESSURE	STRAIN
0	0.0
500	-1.3
1000	.9
1500	.9
2000	-1.3
2500	-9.6
3000	-16.5
3500	-27.4
4000	-36.1
4500	-41.7
5000	-43.5
5500	-50.4
6000	-54.3
5500	-49.1
5000	-44.3
4500	-38.7
4000	-33.5
3500	-27.8
3000	-22.2
2500	-17.0
2000	-11.7
1500	-7.0
1000	-.9
500	6.1
6000	-66.5
5000	-55.2
4000	-43.5
3000	-30.9
2000	-19.1
2500	-27.4
3000	-34.0
3500	-40.9
4000	-47.4
4500	-53.5
5000	-59.6
5500	-65.2
6000	-69.6
5000	-58.7
4000	-46.5
3000	-33.9
2000	-21.7
1500	-15.2
1000	-7.0
500	.9
0	0.7

Plate 214



Y=MX	M	B	R^2
	497.835	0.00	-1.0140

CALSTEPS

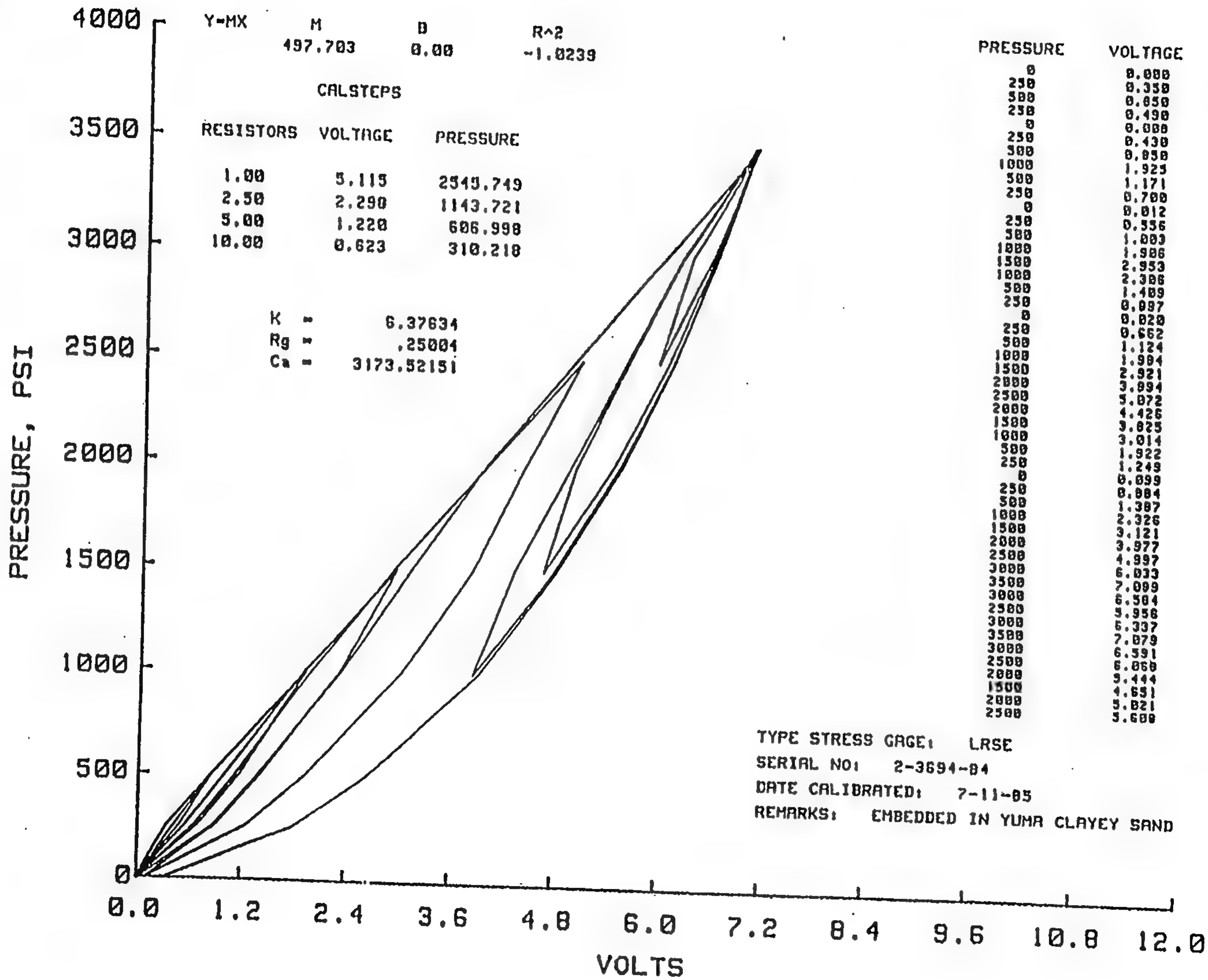
RESISTORS	VOLTAGE	PRESSURE
1.00	5.519	2747.552
2.50	2.490	1239.610
5.00	1.322	658.130
10.00	0.676	336.537

K = 6.92273
Rg = .25751
Ca = 3446.37839

PRESSURE	VOLTAGE
0	0.000
250	0.459
500	0.899
250	0.523
0	0.032
250	0.478
500	0.910
1000	1.924
500	1.180
250	0.717
0	0.051
250	0.592
500	1.031
1000	1.947
1500	2.957
1000	2.307
500	1.430
250	0.870
0	0.090
250	0.746
500	1.199
1000	2.000
1500	2.562
2000	3.999
2500	5.015
2000	4.396
1500	3.779
1000	2.975
500	1.932
250	1.261
0	0.175
250	0.950
500	1.495
1000	2.444
1500	3.270
2000	4.104
2500	5.005
3000	6.041
3500	7.029
3000	6.554
2500	6.000
3000	6.355
3500	7.075
3000	6.606
2500	6.060
2000	5.426
1500	4.655
2000	5.122
2500	5.680

PRESSURE	VOLTAGE
3000	6.250
3500	7.099
3000	6.650
2500	6.140
2000	5.533
1500	4.757
1000	3.001
1500	4.305
2000	4.942
2500	5.617
3000	6.240
3500	7.046
3000	6.652
2500	6.149
2000	5.555
1500	4.794
1000	3.862
500	2.569
250	1.790
0	0.288

TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3703-84
DATE CALIBRATED: 7-11-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND



Y=MX	M	B	R^2
	497.703	0.00	-1.0239

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.115	2545.749
2.50	2.290	1143.721
5.00	1.220	606.998
10.00	0.623	310.218

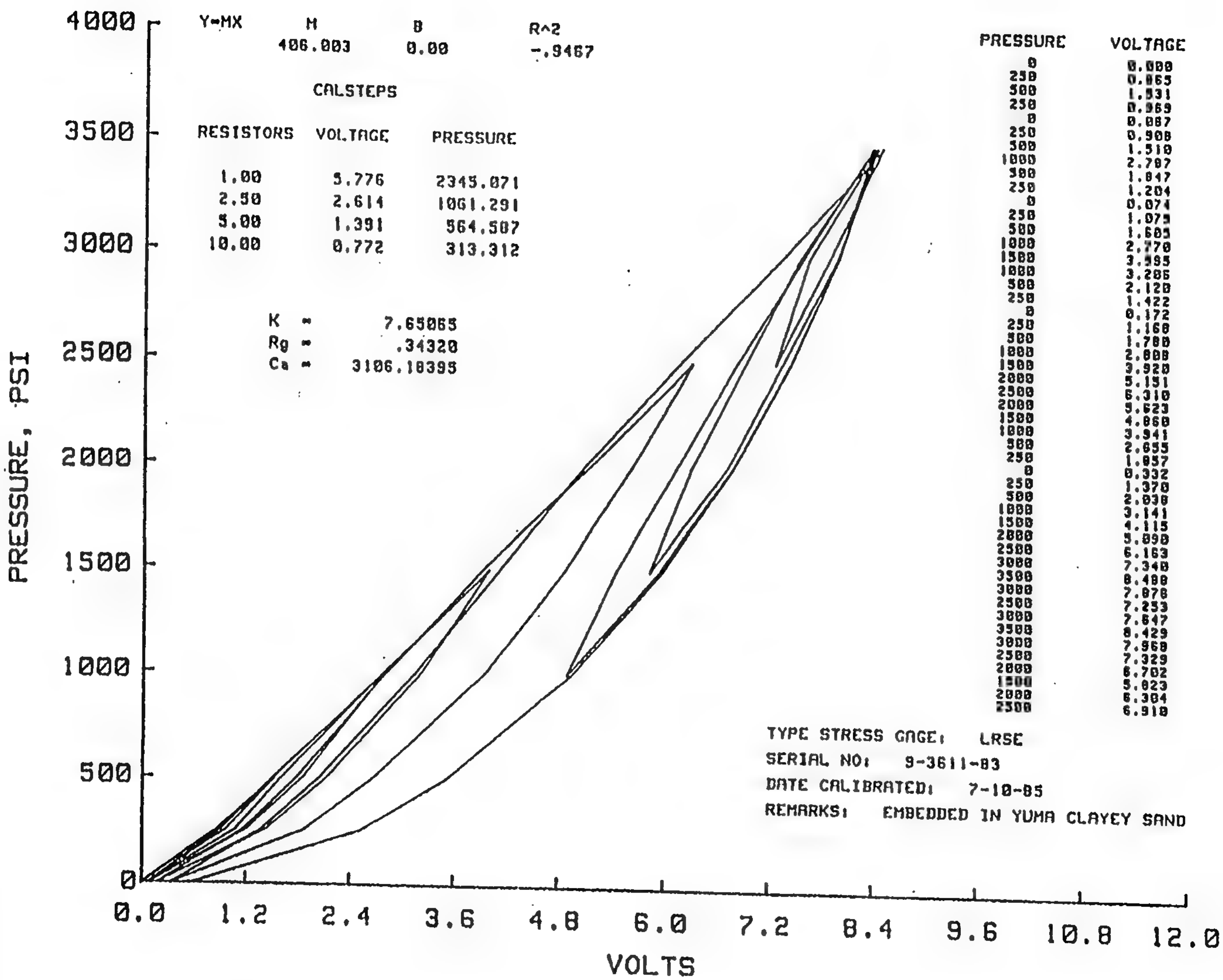
K = 6.37634
Rg = .25004
Ca = 3173.52151

PRESSURE	VOLTAGE
0	0.000
250	0.350
500	0.850
250	0.490
0	0.000
250	0.430
500	0.850
1000	1.925
500	1.171
250	0.700
0	0.012
250	0.556
500	1.003
1000	1.906
1500	2.953
1000	2.308
500	1.409
250	0.897
0	0.020
250	0.662
500	1.124
1000	1.904
1500	2.921
2000	3.894
2500	5.072
2000	4.426
1500	3.825
1000	3.014
500	1.922
250	1.249
0	0.099
250	0.884
500	1.387
1000	2.326
1500	3.121
2000	3.977
2500	4.997
3000	6.033
3500	7.099
3000	6.504
2500	5.956
3000	6.337
3500	7.079
3000	6.591
2500	6.060
2000	5.444
1500	4.651
2000	5.021
2500	5.600

PRESSURE	VOLTAGE
3000	6.234
3500	7.066
3000	6.630
2500	6.121
2000	5.510
1500	4.767
1000	3.840
1500	4.315
2000	4.960
2500	5.592
3000	6.223
3500	7.047
3000	6.612
2500	6.126
2000	5.544
1500	4.797
1000	3.908
500	2.627
250	1.797
0	0.389

TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3694-84
DATE CALIBRATED: 7-11-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

Plate 216



Y=MX	M	B	R^2
	406.003	0.00	-.9467

CALSTEPS

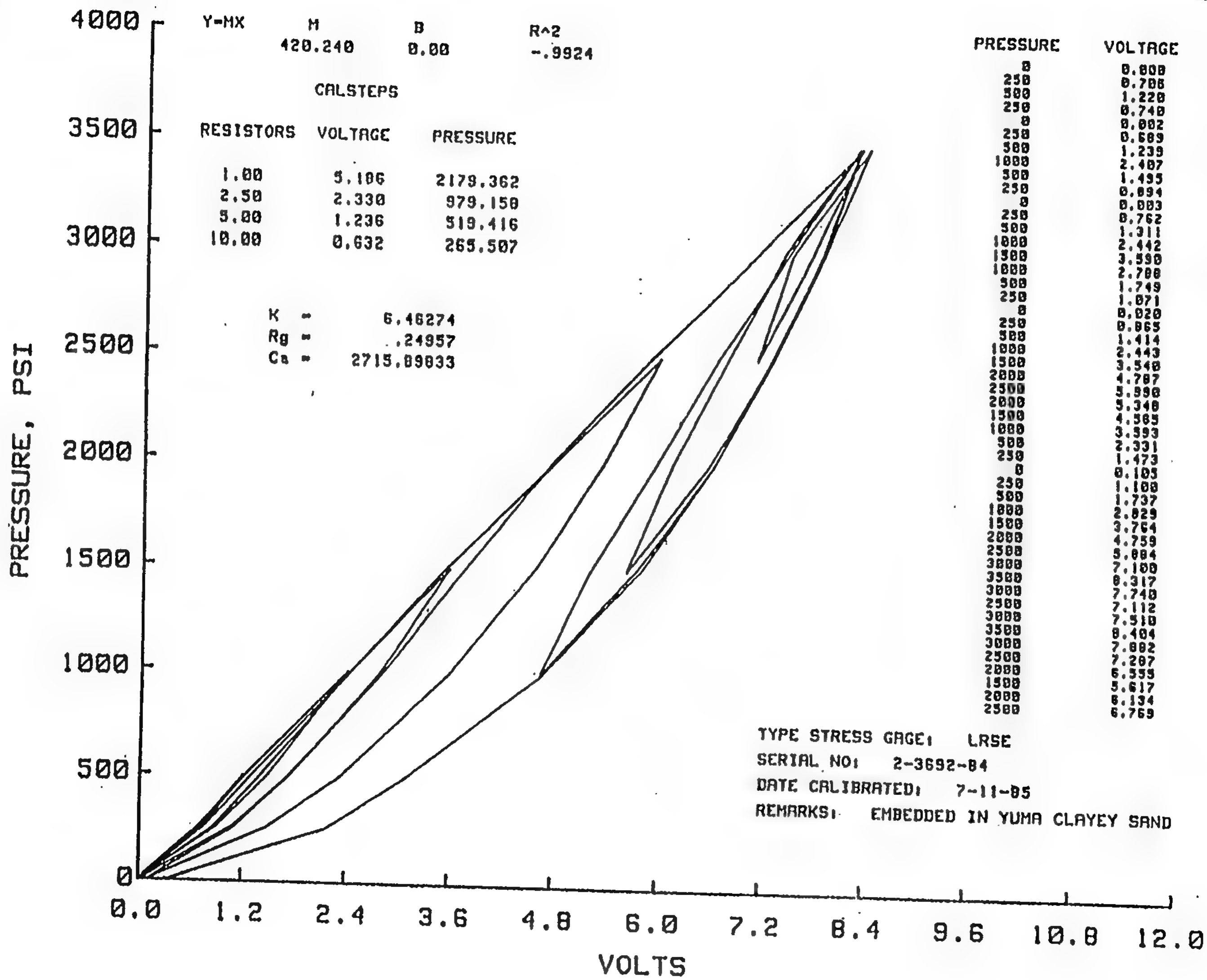
RESISTORS	VOLTAGE	PRESSURE
1.00	5.776	2345.071
2.50	2.614	1061.291
5.00	1.391	564.507
10.00	0.772	313.312

K = 7.65065
Rg = .34320
Ca = 3106.18395

PRESSURE	VOLTAGE
0	0.000
250	0.065
500	1.531
250	0.969
0	0.087
250	0.908
500	1.510
1000	2.707
500	1.847
250	1.204
0	0.074
250	1.075
500	1.605
1000	2.770
1500	3.595
1000	3.286
500	2.120
250	1.422
0	0.172
250	1.160
500	1.780
1000	2.808
1500	3.920
2000	5.151
2500	6.310
2000	5.623
1500	4.860
1000	3.941
500	2.655
250	1.857
0	0.332
250	1.370
500	2.030
1000	3.141
1500	4.115
2000	5.090
2500	6.163
3000	7.340
3500	8.400
3000	7.870
2500	7.253
3000	7.647
3500	8.429
3000	7.960
2500	7.329
2000	6.702
1500	5.023
2000	6.304
2500	6.910

PRESSURE	VOLTAGE
3000	7.544
3500	8.397
3000	7.974
2500	7.426
2000	6.764
1500	5.924
1000	4.087
1500	5.446
2000	6.133
2500	6.012
3000	7.500
3500	8.369
3000	7.979
2500	7.423
2000	6.775
1500	5.963
1000	4.935
500	3.505
250	2.500
0	0.560

TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3611-83
DATE CALIBRATED: 7-10-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND



Y=MX	M	B	R^2
	420.240	0.00	-.9924

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.106	2179.362
2.50	2.330	979.150
5.00	1.236	519.416
10.00	0.632	265.507

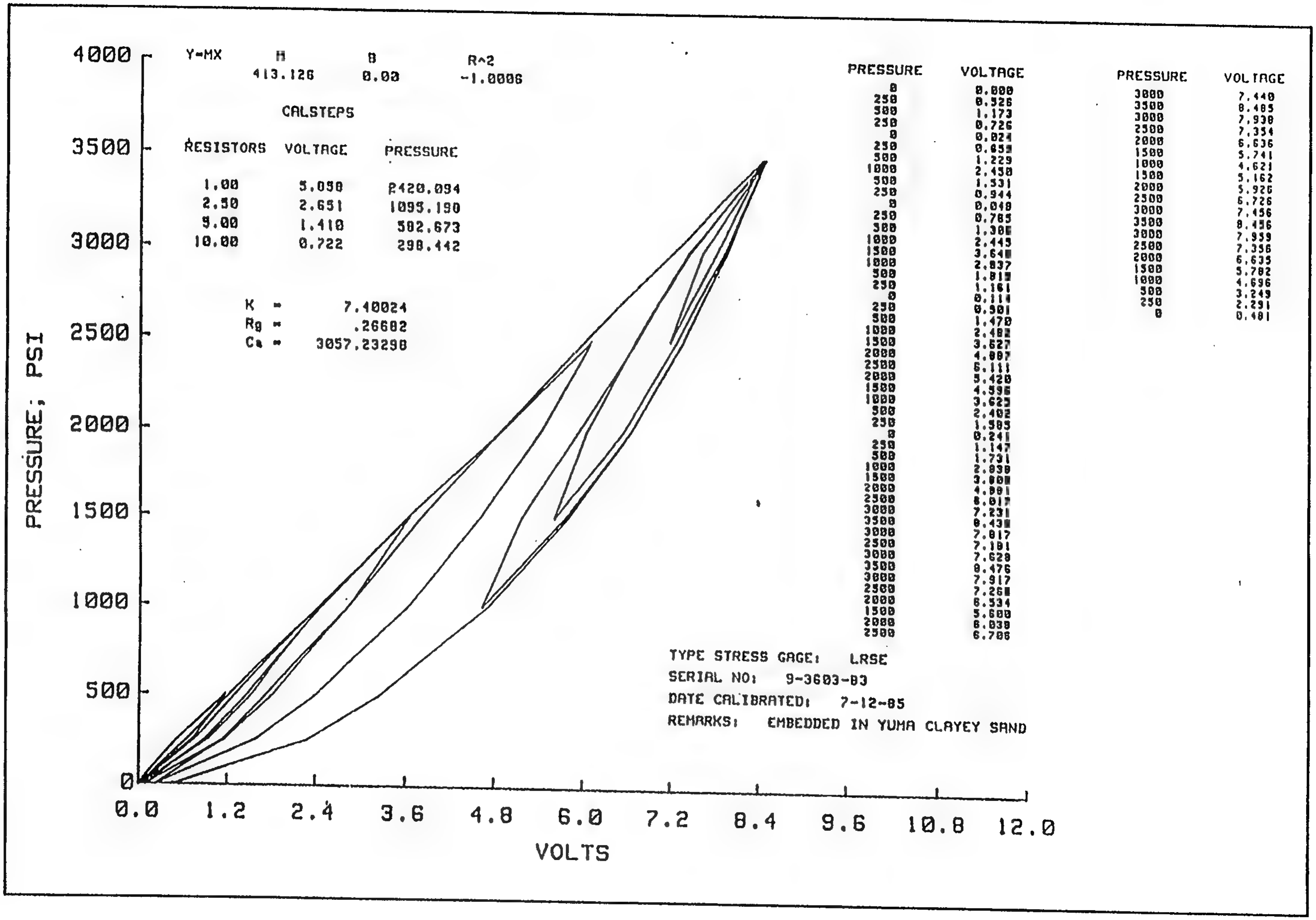
K = 6.46274
Rg = .24957
Ca = 2715.89833

PRESSURE	VOLTAGE
0	0.000
250	0.706
500	1.220
250	0.740
0	0.002
250	0.689
500	1.239
1000	2.407
500	1.495
250	0.894
0	0.003
250	0.762
500	1.311
1000	2.442
1500	3.590
1000	2.700
500	1.749
250	1.071
0	0.020
250	0.865
500	1.414
1000	2.443
1500	3.540
2000	4.787
2500	5.990
2000	5.340
1500	4.565
1000	3.393
500	2.331
250	1.473
0	0.105
250	1.100
500	1.737
1000	2.829
1500	3.764
2000	4.759
2500	5.884
3000	7.100
3500	8.317
3000	7.740
2500	7.112
3000	7.510
3500	8.404
3000	7.802
2500	7.207
2000	6.555
1500	5.617
2000	6.134
2500	6.769

PRESSURE	VOLTAGE
3000	7.414
3500	8.281
3000	7.860
2500	7.277
2000	6.600
1500	5.720
1000	4.641
1500	5.212
2000	5.946
2500	6.650
3000	7.461
3500	8.301
3000	7.875
2500	7.294
2000	6.613
1500	5.772
1000	4.670
500	3.095
250	2.156
0	0.330

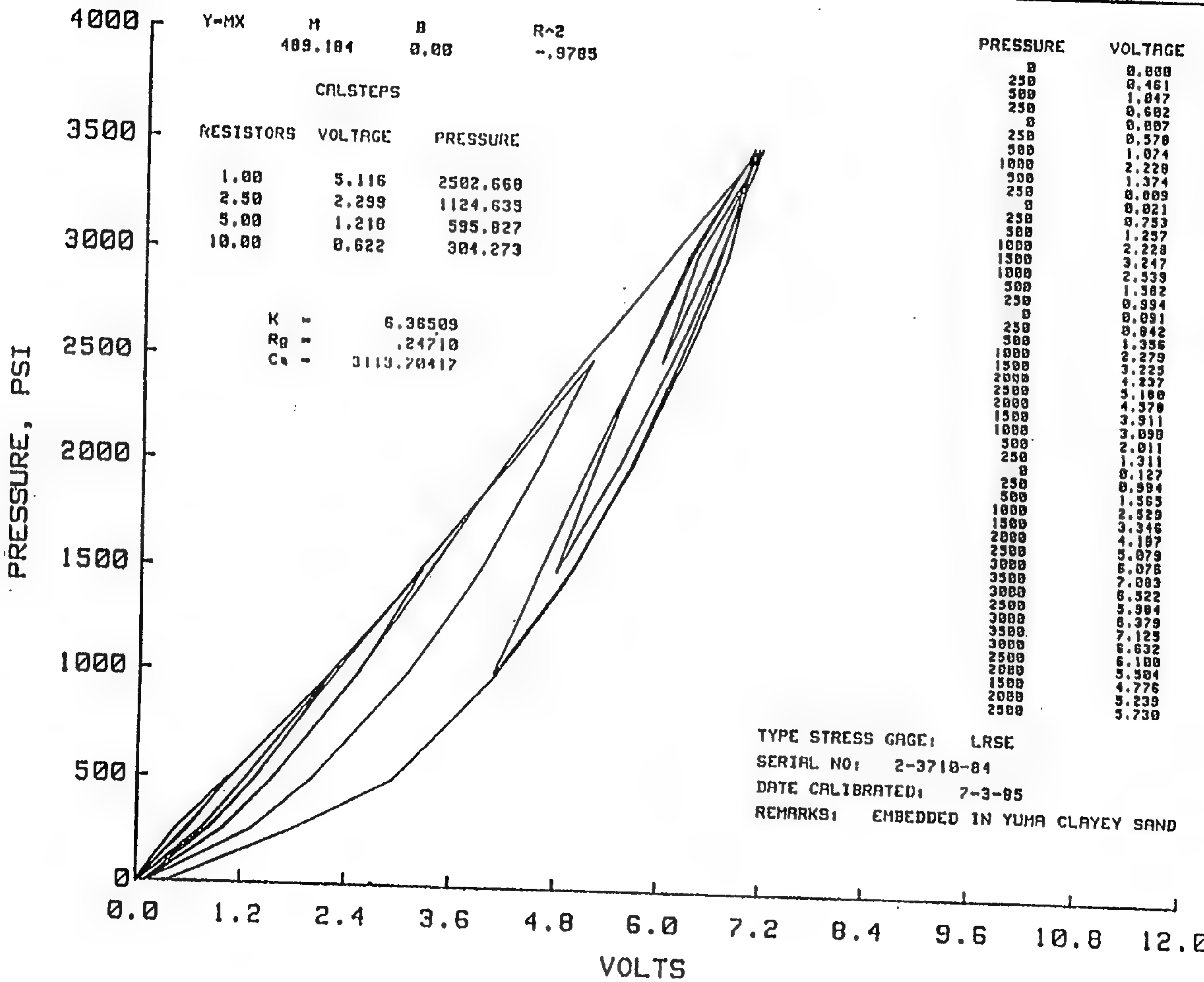
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3692-84
DATE CALIBRATED: 7-11-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

Plate 218



Y=MX M B R^2
413.126 0.00 -1.0006
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.050 2420.094
2.50 2.651 1095.190
5.00 1.410 582.673
10.00 0.722 298.442
K = 7.40024
Rg = .26682
Ca = 3057.23290
PRESSURE VOLTAGE
0 0.000
250 0.526
500 1.173
250 0.726
0 0.024
250 0.655
500 1.229
1000 2.450
500 1.531
250 0.944
0 0.040
250 0.785
500 1.308
1000 2.445
1500 3.648
1000 2.837
500 1.815
250 1.161
0 0.114
250 0.901
500 1.470
1000 2.482
1500 3.627
2000 4.887
2500 6.111
2000 5.420
1500 4.596
1000 3.625
500 2.402
250 1.585
0 0.241
250 1.147
500 1.731
1000 2.830
1500 3.808
2000 4.801
2500 6.017
3000 7.231
3500 8.438
3000 7.817
2500 7.101
3000 7.620
3500 8.476
3000 7.917
2500 7.268
2000 6.534
1500 5.600
2000 6.030
2500 6.708
PRESSURE VOLTAGE
3000 7.440
3500 8.485
3000 7.930
2500 7.354
2000 6.636
1500 5.741
1000 4.621
1500 5.162
2000 5.926
2500 6.726
3000 7.456
3500 8.456
3000 7.959
2500 7.356
2000 6.635
1500 5.782
1000 4.696
500 3.249
250 2.291
0 0.481
TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3603-83
DATE CALIBRATED: 7-12-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND
PRESSURE, PSI
4000
3500
3000
2500
2000
1500
1000
500
0
0.0 1.2 2.4 3.6 4.8 6.0 7.2 8.4 9.6 10.8 12.0
VOLTS

Plate 219



Y=MX	M	B	R^2
	409.184	0.00	-.9785

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.116	2502.660
2.50	2.299	1124.635
5.00	1.210	595.827
10.00	0.622	304.273

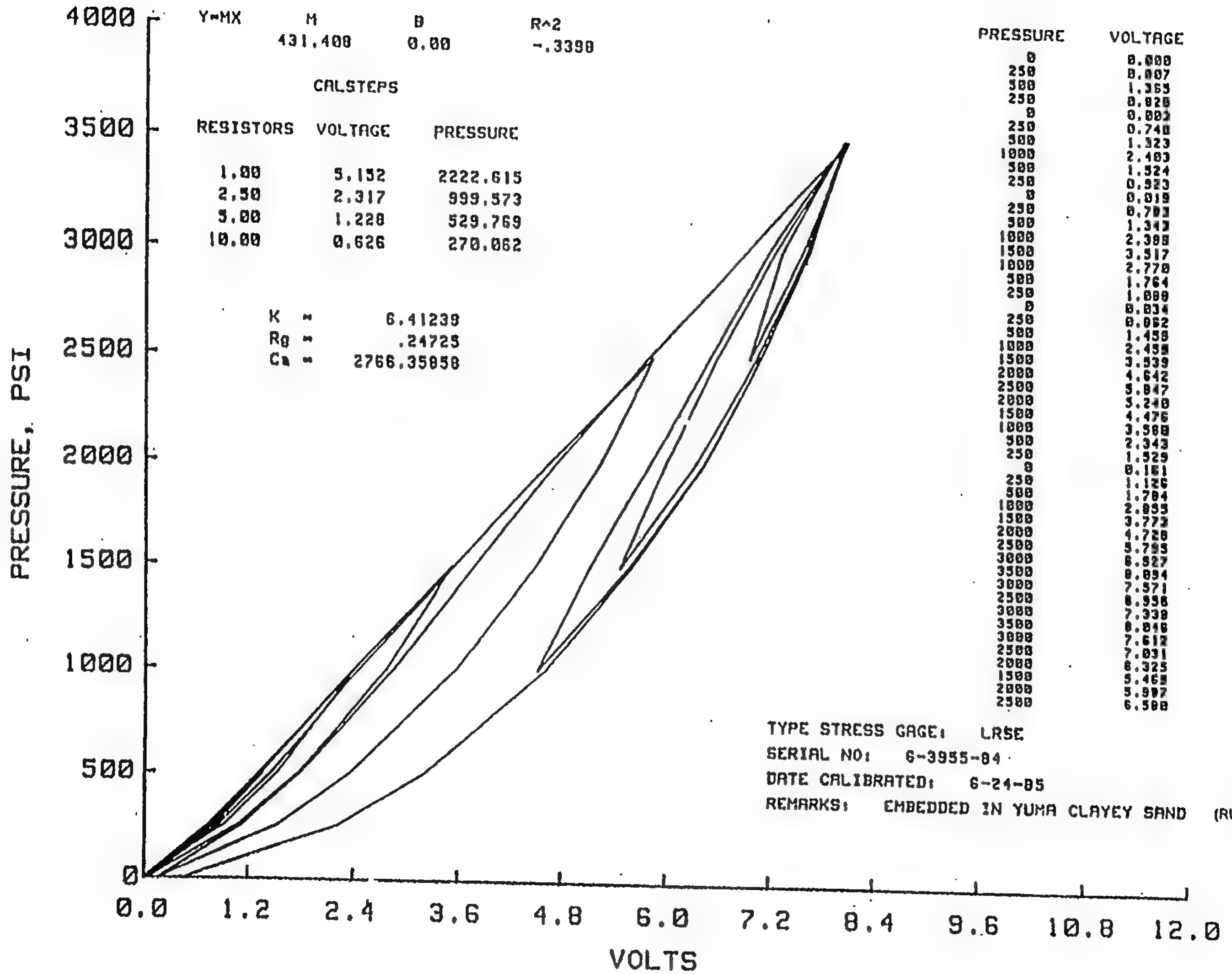
K = 6.36509
Rg = .24710
Ca = 3113.70417

PRESSURE	VOLTAGE
0	0.000
250	0.461
500	1.047
250	0.602
0	0.007
250	0.570
500	1.074
1000	2.220
500	1.374
250	0.009
0	0.021
250	0.753
500	1.257
1000	2.228
1500	3.247
1000	2.539
500	1.582
250	0.994
0	0.091
250	0.842
500	1.356
1000	2.279
1500	3.225
2000	4.237
2500	5.160
2000	4.570
1500	3.911
1000	3.090
500	2.011
250	1.311
0	0.127
250	0.984
500	1.565
1000	2.529
1500	3.346
2000	4.107
2500	5.079
3000	6.076
3500	7.083
3000	6.522
2500	5.984
3000	6.379
3500	7.125
3000	6.632
2500	6.100
2000	5.504
1500	4.776
2000	5.239
2500	5.730

PRESSURE	VOLTAGE
3000	6.287
3500	7.031
3000	6.737
2500	6.232
2000	5.656
1500	4.946
1000	4.076
1500	4.590
2000	5.152
2500	5.751
3000	6.322
3500	7.031
3000	6.654
2500	6.106
2000	5.641
1500	4.961
1000	4.112
500	2.930
250	1.771
0	0.342

TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-84
DATE CALIBRATED: 7-3-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

Plate 220



Y=MX	M	B	R^2
	431.408	0.00	-.3398

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.152	2222.615
2.50	2.317	999.573
5.00	1.228	529.769
10.00	0.626	270.062

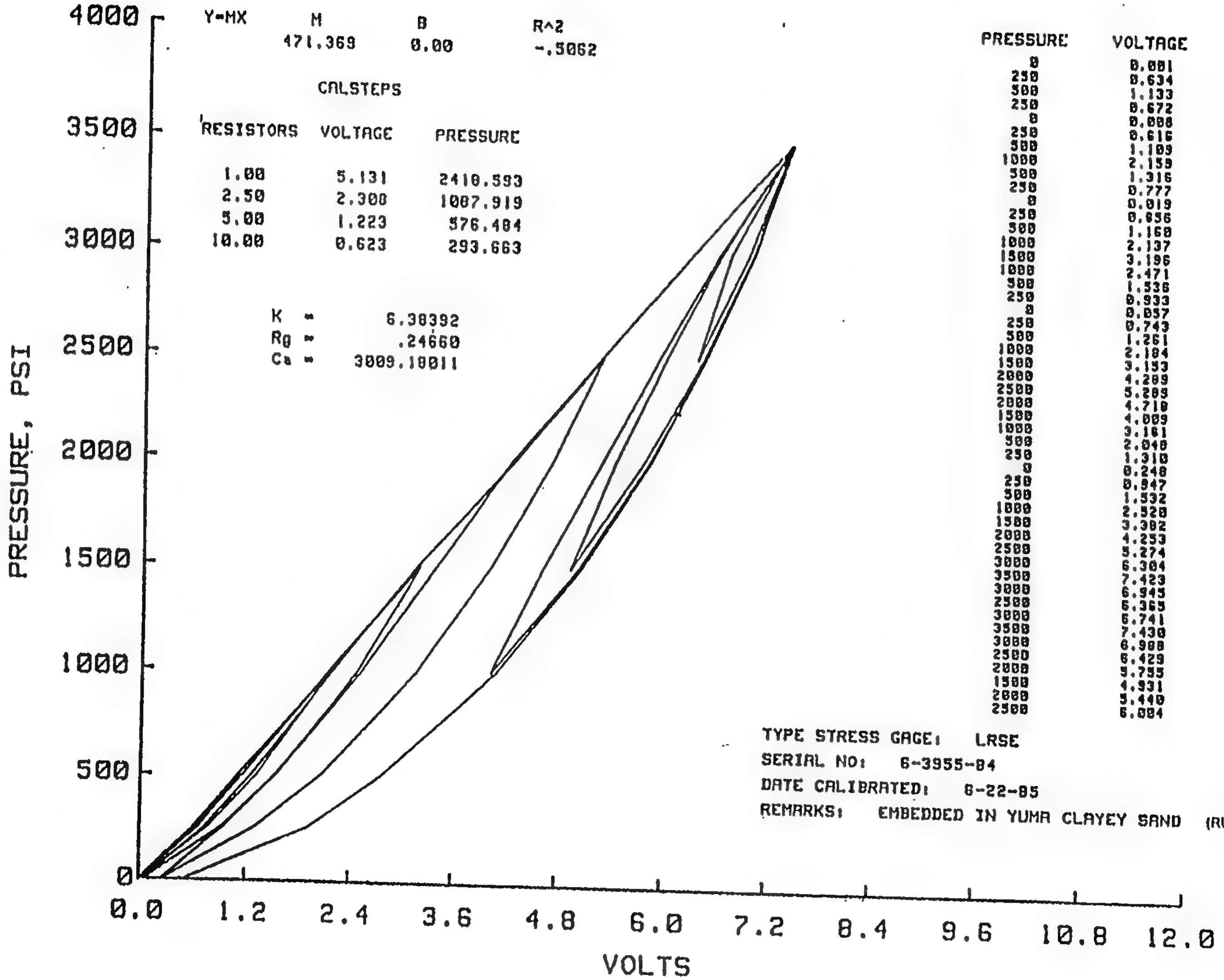
K = 6.41239
Rg = .24725
Ca = 2766.35858

PRESSURE	VOLTAGE
0	0.000
250	0.[illegible]07
500	1.365
250	0.828
0	0.00[illegible]
250	0.740
500	1.323
1000	2.403
500	1.524
250	0.923
0	0.019
250	0.703
500	1.343
1000	2.388
1500	3.517
1000	2.770
500	1.764
250	1.000
0	0.034
250	0.862
500	1.458
1000	2.455
1500	3.539
2000	4.642
2500	5.847
2000	5.240
1500	4.476
1000	3.588
500	2.343
250	1.529
0	0.161
250	1.126
500	1.704
1000	2.855
1500	3.773
2000	4.728
2500	5.795
3000	6.927
3500	8.094
3000	7.571
2500	6.956
3000	7.338
3500	8.018
3000	7.612
2500	7.031
2000	6.325
1500	5.465
2000	5.997
2500	6.588

PRESSURE	VOLTAGE
3000	7.255
3500	8.065
3000	7.652
2500	7.070
2000	6.430
1500	5.562
1000	4.507
1500	5.118
2000	5.807
2500	6.497
3000	7.183
3500	8.050
3000	7.629
2500	7.081
2000	6.422
1500	5.592
1000	4.595
500	3.186
250	2.201
0	0.447

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 6-24-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #1)

Plate 221



Y=MX	M	B	R^2
	471.369	0.00	-.5062

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.131	2410.593
2.50	2.300	1087.919
5.00	1.223	576.404
10.00	0.623	293.663

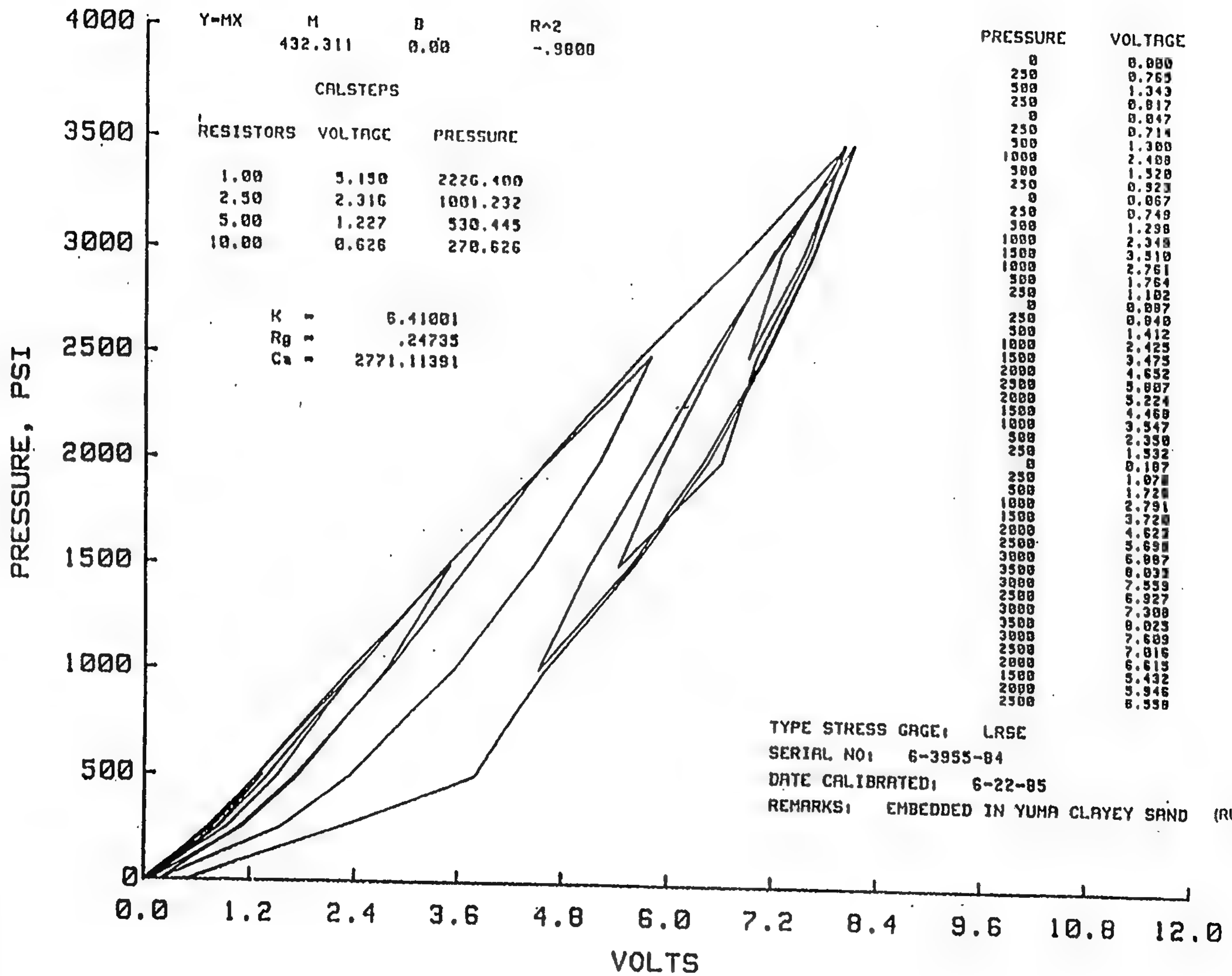
K = 6.38392
Rg = .24660
Ca = 3009.10011

PRESSURE	VOLTAGE
0	0.001
250	0.634
500	1.133
250	0.672
0	0.008
250	0.616
500	1.109
1000	2.159
500	1.316
250	0.777
0	0.019
250	0.056
500	1.160
1000	2.137
1500	3.196
1000	2.471
500	1.536
250	0.933
0	0.057
250	0.743
500	1.261
1000	2.184
1500	3.153
2000	4.209
2500	5.209
2000	4.710
1500	4.009
1000	3.161
500	2.048
250	1.310
0	0.248
250	0.947
500	1.532
1000	2.520
1500	3.302
2000	4.253
2500	5.274
3000	6.304
3500	7.423
3000	6.945
2500	6.365
3000	6.741
3500	7.430
3000	6.908
2500	6.429
2000	5.755
1500	4.931
2000	5.440
2500	6.084

PRESSURE	VOLTAGE
3000	6.630
3500	7.422
3000	7.000
2500	6.455
2000	5.813
1500	5.020
1000	4.026
1500	4.615
2000	5.200
2500	5.923
3000	6.607
3500	7.446
3000	7.000
2500	6.440
2000	5.830
1500	5.052
1000	4.002
500	2.744
250	1.913
0	0.400

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 8-22-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #2)

Plate 222



Y=MX	M	B	R^2
	432.311	0.00	-.9800

CALSTEPS

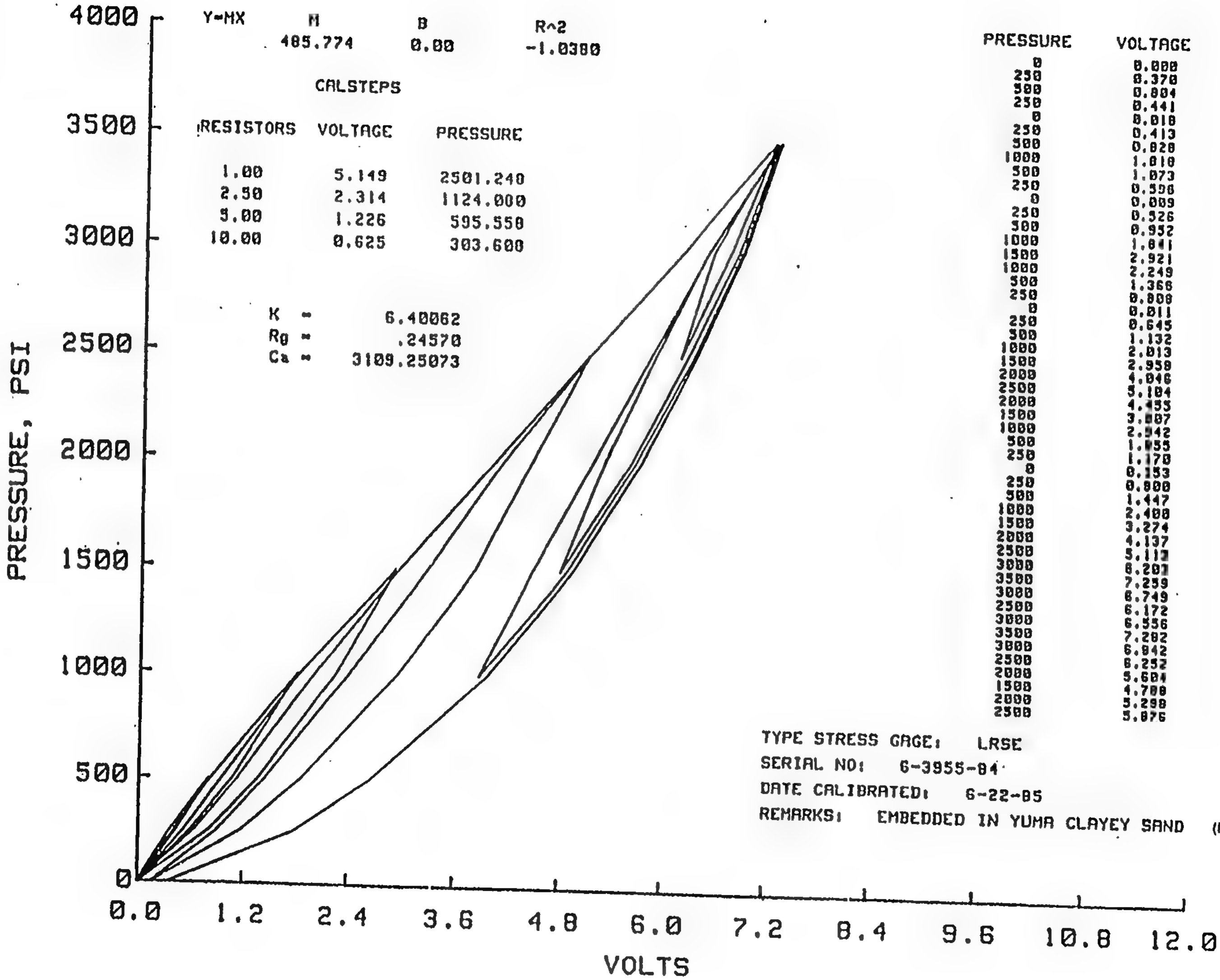
RESISTORS	VOLTAGE	PRESSURE
1.00	5.150	2226.400
2.50	2.316	1001.232
5.00	1.227	530.445
10.00	0.626	270.626

K = 6.41001
Rg = .24735
Ca = 2771.11391

PRESSURE	VOLTAGE
0	0.000
250	0.765
500	1.343
250	0.817
0	0.047
250	0.714
500	1.300
1000	2.400
500	1.520
250	0.923
0	0.067
250	0.749
500	1.298
1000	2.349
1500	3.510
1000	2.761
500	1.764
250	1.102
0	0.087
250	0.840
500	1.412
1000	2.425
1500	3.475
2000	4.652
2500	5.087
2000	5.224
1500	4.460
1000	3.547
500	2.350
250	1.532
0	0.187
250	1.078
500	1.728
1000	2.791
1500	3.720
2000	4.623
2500	5.698
3000	6.887
3500	8.033
3000	7.559
2500	6.927
3000	7.300
3500	8.025
3000	7.609
2500	7.016
2000	6.615
1500	5.432
2000	5.946
2500	6.550

PRESSURE	VOLTAGE
3000	7.200
3500	8.133
3000	7.654
2500	7.000
2000	6.401
1500	5.561
1000	4.520
1500	5.103
2000	5.798
2500	6.400
3000	7.233
3500	8.136
3000	7.677
2500	7.114
2000	6.456
1500	5.601
1000	4.599
500	3.000
250	2.101
0	0.400

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 6-22-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #3)



Y=MX	M	B	R^2
	485.774	0.00	-1.0380

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.149	2501.240
2.50	2.314	1124.000
5.00	1.226	595.550
10.00	0.625	303.600

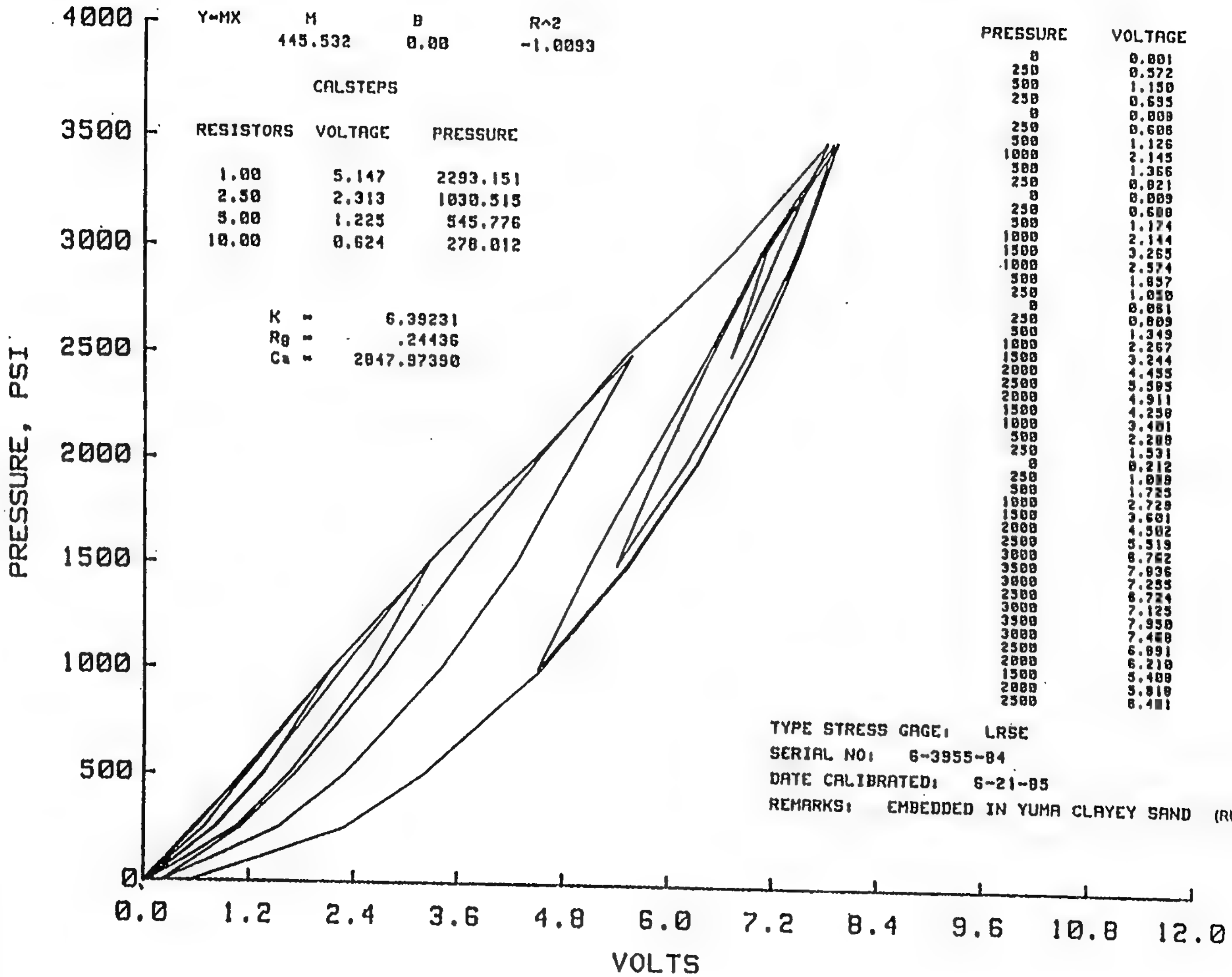
K = 6.40062
Rg = .24570
Ca = 3109.25073

PRESSURE	VOLTAGE
0	0.000
250	0.370
500	0.804
250	0.441
0	0.010
250	0.413
500	0.820
1000	1.010
500	1.073
250	0.598
0	0.009
250	0.526
500	0.952
1000	1.841
1500	2.921
1000	2.249
500	1.368
250	0.808
0	0.011
250	0.645
500	1.132
1000	2.013
1500	2.958
2000	4.046
2500	5.104
2000	4.455
1500	3.807
1000	2.542
500	1.955
250	1.170
0	0.153
250	0.800
500	1.447
1000	2.400
1500	3.274
2000	4.137
2500	5.113
3000	6.203
3500	7.259
3000	6.749
2500	6.172
3000	6.556
3500	7.282
3000	6.942
2500	6.252
2000	5.604
1500	4.700
2000	5.298
2500	5.876

PRESSURE	VOLTAGE
3000	6.490
3500	7.310
3000	6.877
2500	6.322
2000	5.652
1500	4.862
1000	3.872
1500	4.473
2000	5.161
2500	5.023
3000	6.496
3500	7.327
3000	6.909
2500	6.356
2000	5.710
1500	4.928
1000	3.959
500	2.635
250	1.780
0	0.333

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 6-22-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #4)

Plate 224



Y=MX	M	B	R^2
	445.532	0.00	-1.0093

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.147	2293.151
2.50	2.313	1030.515
5.00	1.225	545.776
10.00	0.624	278.012

K = 6.39231
R_g = .24436
Ca = 2047.97390

PRESSURE	VOLTAGE
0	0.001
250	0.572
500	1.150
250	0.695
0	0.008
250	0.608
500	1.126
1000	2.145
500	1.366
250	0.821
0	0.009
250	0.600
500	1.174
1000	2.144
1500	3.265
1000	2.574
500	1.857
250	1.050
0	0.081
250	0.809
500	1.349
1000	2.267
1500	3.244
2000	4.455
2500	5.505
2000	4.911
1500	4.250
1000	3.401
500	2.208
250	1.531
0	0.212
250	1.088
500	1.725
1000	2.728
1500	3.601
2000	4.502
2500	5.519
3000	6.762
3500	7.836
3000	7.255
2500	6.724
3000	7.125
3500	7.950
3000	7.460
2500	6.891
2000	6.210
1500	5.400
2000	5.810
2500	6.481

PRESSURE	VOLTAGE
3000	7.100
3500	7.951
3000	7.509
2500	6.969
2000	6.334
1500	5.522
1000	4.510
1500	5.095
2000	5.750
2500	6.450
3000	7.073
3500	7.904
3000	7.490
2500	6.971
2000	6.344
1500	5.347
1000	4.552
500	3.198
250	2.284
0	0.523

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 6-21-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #5)

Plate 225

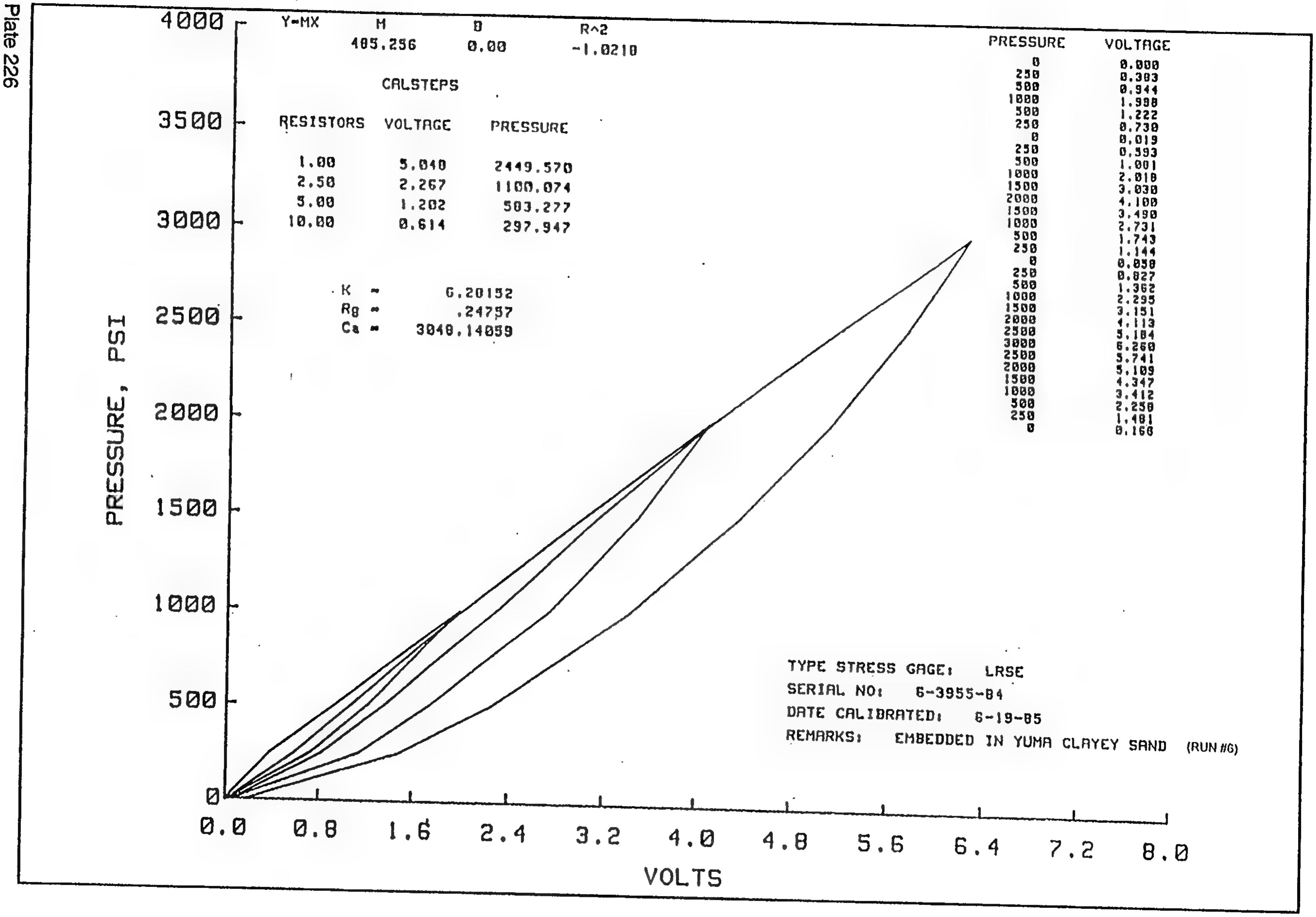
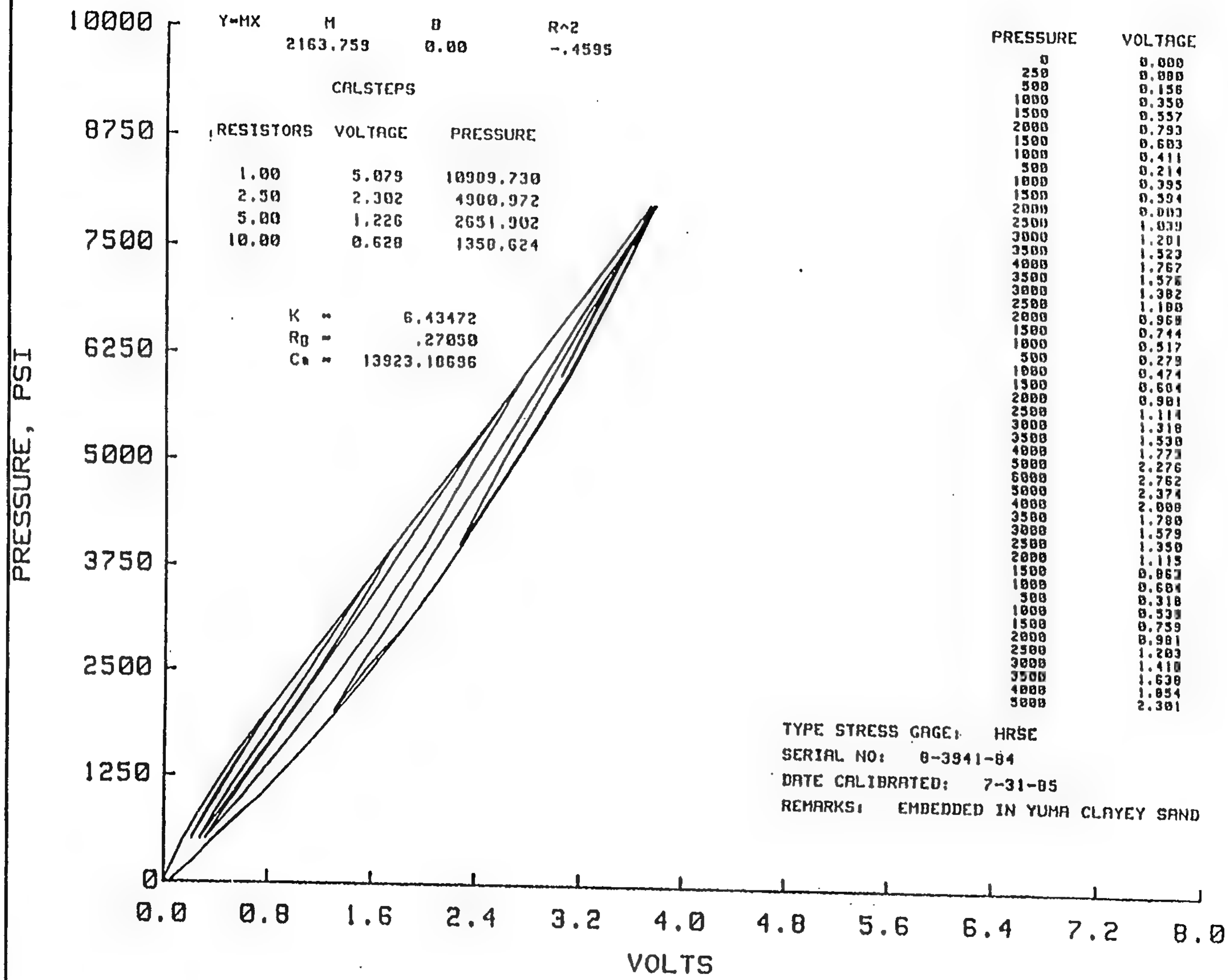

Y=MX M B R^2
405.256 0.00 -1.0210
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.040 2449.570
2.50 2.267 1100.074
5.00 1.202 583.277
10.00 0.614 297.947
K = 6.20152
Rg = .24757
Ca = 3040.14059
PRESSURE VOLTAGE
0 0.000
250 0.383
500 0.944
1000 1.988
500 1.222
250 0.730
0 0.019
250 0.593
500 1.001
1000 2.010
1500 3.030
2000 4.100
1500 3.490
1000 2.731
500 1.743
250 1.144
0 0.050
250 0.827
500 1.362
1000 2.295
1500 3.151
2000 4.113
2500 5.184
3000 6.260
2500 5.741
2000 5.109
1500 4.347
1000 3.412
500 2.250
250 1.481
0 0.160
TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 6-19-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #6)
PRESSURE, PSI
4000
3500
3000
2500
2000
1500
1000
500
0
0.0
0.8
1.6
2.4
3.2
4.0
4.8
5.6
6.4
7.2
8.0
VOLTS

Plate 226



Y=MX	M	B	R^2
	2163.759	0.00	-.4595

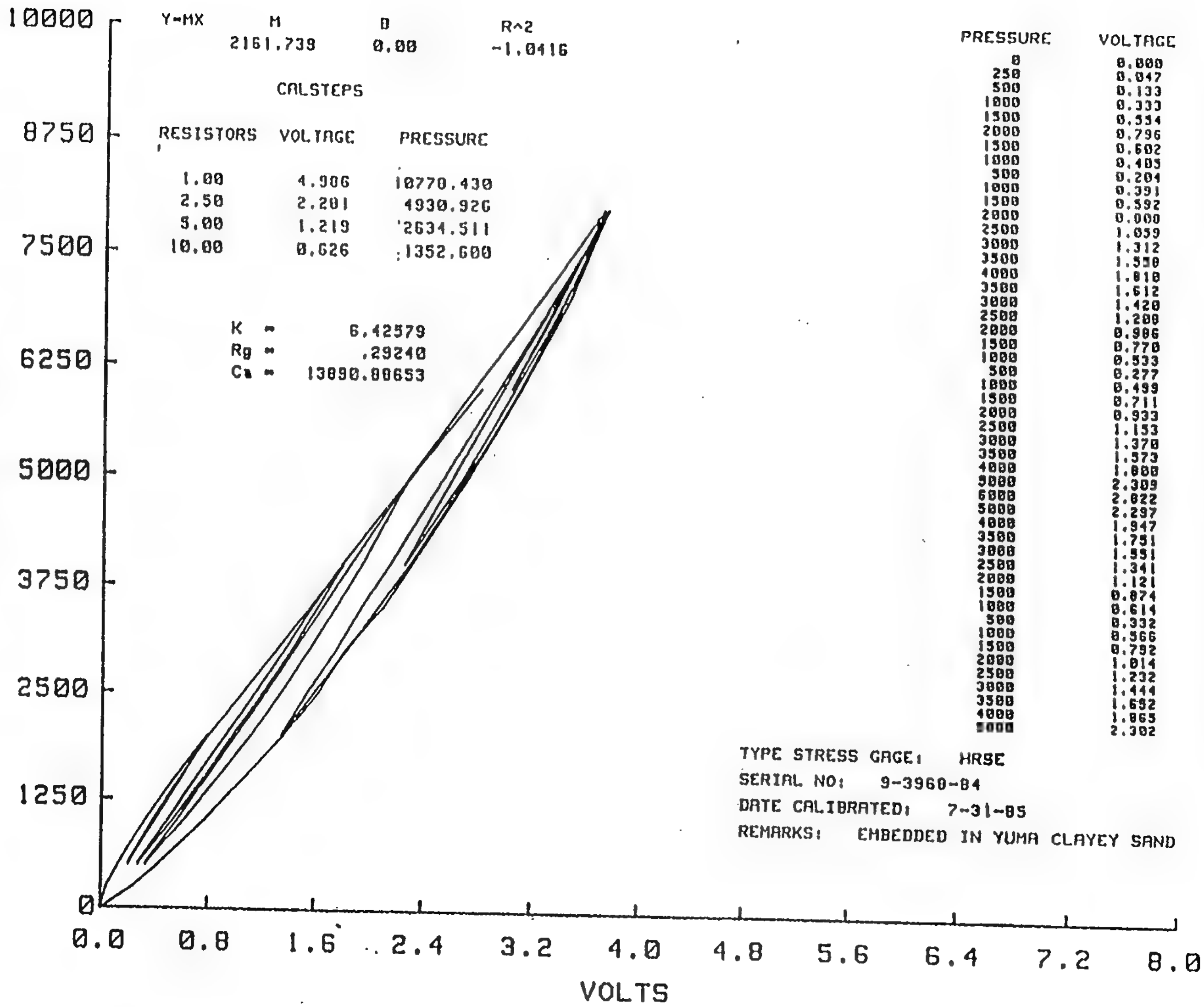
CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.079	10909.730
2.50	2.302	4900.972
5.00	1.226	2651.902
10.00	0.628	1350.624

K = 6.43472
Rg = .27050
C* = 13923.10696

PRESSURE	VOLTAGE	PRESSURE	VOLTAGE
0	0.000	6000	2.757
250	0.000	7000	3.256
500	0.156	8000	3.745
1000	0.350	7000	3.401
1500	0.557	6000	3.047
2000	0.793	7000	3.377
1500	0.603	8000	3.789
1000	0.411	7000	3.452
500	0.214	6000	3.091
1000	0.395	5000	2.699
1500	0.394	4000	2.270
2000	0.803	5000	2.610
2500	1.039	6000	2.901
3000	1.201	7000	3.362
3500	1.523	8000	3.776
4000	1.767	7000	3.456
3500	1.576	6000	3.111
3000	1.382	5000	2.709
2500	1.100	4000	2.291
2000	0.968	3500	2.066
1500	0.744	3000	1.831
1000	0.517	2500	1.540
500	0.279	2000	1.290
1000	0.474	2500	1.480
1500	0.604	3000	1.709
2000	0.901	3500	1.905
2500	1.114	4000	2.106
3000	1.318	5000	2.525
3500	1.530	6000	2.921
4000	1.773	7000	3.329
5000	2.276	8000	3.769
6000	2.762	7000	3.450
5000	2.374	6000	3.095
4000	2.000	5000	2.697
3500	1.780	4000	2.290
3000	1.579	3500	2.069
2500	1.350	3000	1.838
2000	1.115	2500	1.586
1500	0.863	2000	1.321
1000	0.604	1500	1.035
500	0.318	1000	0.736
1000	0.539	500	0.384
1500	0.759	250	0.233
2000	0.981	0	0.043
2500	1.203		
3000	1.418		
3500	1.630		
4000	1.854		
5000	2.301		

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3941-84
DATE CALIBRATED: 7-31-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND



Y=MX	M	B	R^2
	2161.739	0.00	-1.0416

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.906	10770.430
2.50	2.201	4930.926
5.00	1.219	2634.511
10.00	0.626	1352.600

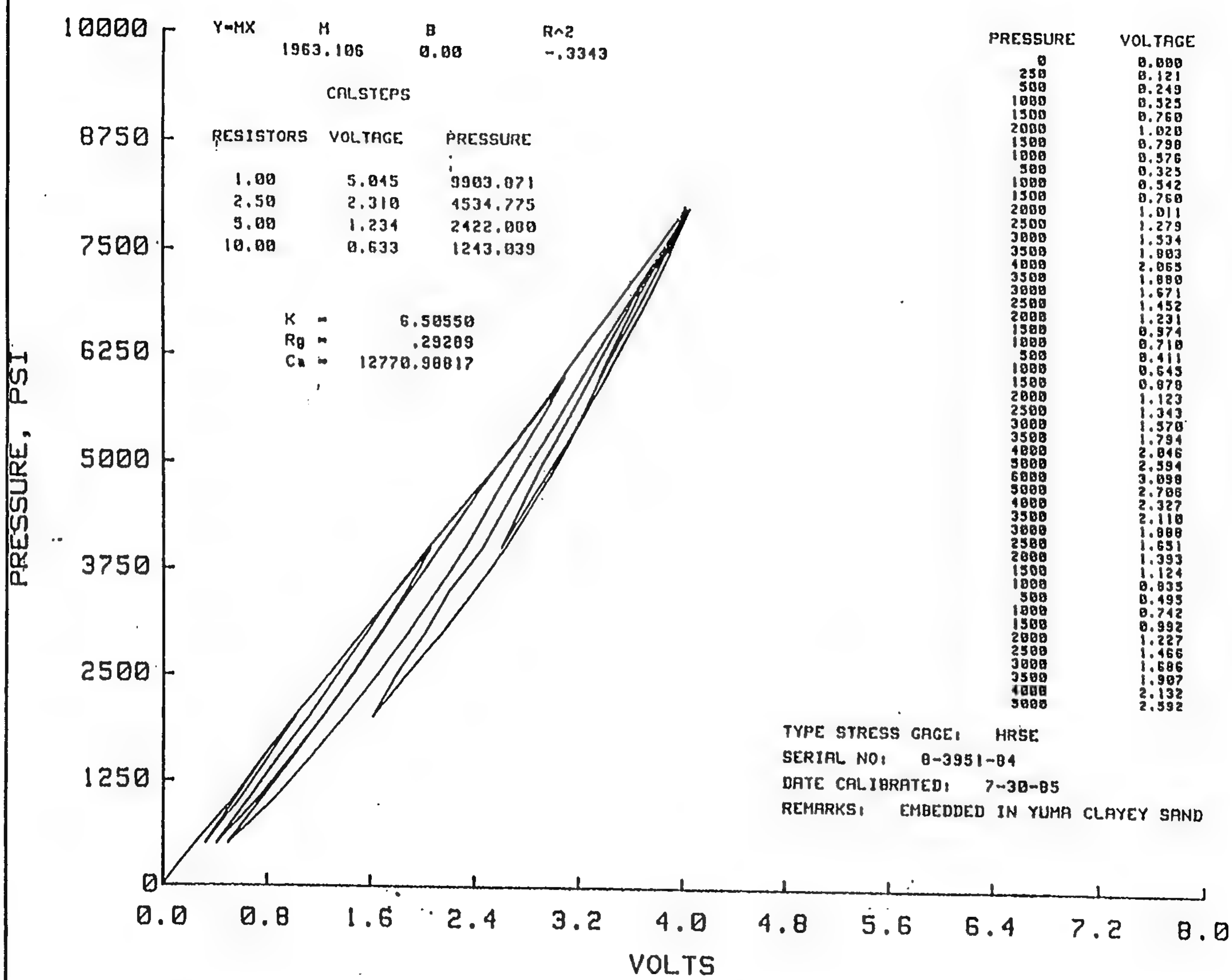
K = 6.42579
Rg = .29240
Ca = 13890.80653

PRESSURE	VOLTAGE
0	0.000
250	0.047
500	0.133
1000	0.333
1500	0.554
2000	0.796
1500	0.602
1000	0.405
500	0.204
1000	0.391
1500	0.592
2000	0.000
2500	1.059
3000	1.312
3500	1.550
4000	1.810
3500	1.612
3000	1.420
2500	1.200
2000	0.986
1500	0.770
1000	0.533
500	0.277
1000	0.499
1500	0.711
2000	0.933
2500	1.153
3000	1.370
3500	1.573
4000	1.800
5000	2.309
6000	2.022
5000	2.297
4000	1.947
3500	1.751
3000	1.551
2500	1.341
2000	1.121
1500	0.874
1000	0.614
500	0.332
1000	0.566
1500	0.792
2000	1.014
2500	1.232
3000	1.444
3500	1.692
4000	1.865
5000	2.302

PRESSURE	VOLTAGE
6000	2.760
7000	3.243
8000	3.725
7000	3.392
6000	3.041
7000	3.373
8000	3.740
7000	3.425
6000	3.064
5000	2.696
4000	2.262
5000	2.619
6000	2.900
7000	3.351
8000	3.755
7000	3.431
6000	3.103
5000	2.720
4000	2.297
3500	2.064
3000	1.835
2500	1.587
2000	1.341
2500	1.538
3000	1.756
3500	1.942
4000	2.153
5000	2.553
6000	2.940
7000	3.346
8000	3.756
7000	3.461
6000	3.109
5000	2.736
4000	2.315
3500	2.100
3000	1.822
2500	1.620
2000	1.362
1500	1.071
1000	0.765
500	0.429
250	0.245
0	0.007

TYPE STRESS GAGE: HRSE
SERIAL NO: 9-3960-84
DATE CALIBRATED: 7-31-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

Plate 228



Y=MX	M	B	R^2
	1963.106	0.00	-.3343

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.045	9903.071
2.50	2.310	4534.775
5.00	1.234	2422.000
10.00	0.633	1243.039

K = 6.50550
Rg = .29209
Ca = 12770.98817

PRESSURE	VOLTAGE
0	0.000
250	0.121
500	0.249
1000	0.525
1500	0.760
2000	1.020
1500	0.790
1000	0.576
500	0.325
1000	0.542
1500	0.760
2000	1.011
2500	1.279
3000	1.534
3500	1.803
4000	2.065
3500	1.880
3000	1.671
2500	1.452
2000	1.231
1500	0.974
1000	0.710
500	0.411
1000	0.645
1500	0.878
2000	1.123
2500	1.343
3000	1.570
3500	1.794
4000	2.046
5000	2.594
6000	3.090
5000	2.706
4000	2.327
3500	2.110
3000	1.888
2500	1.651
2000	1.393
1500	1.124
1000	0.835
500	0.495
1000	0.742
1500	0.992
2000	1.227
2500	1.466
3000	1.686
3500	1.907
4000	2.132
5000	2.592

PRESSURE	VOLTAGE
6000	3.075
7000	3.550
8000	4.029
7000	3.723
6000	3.362
7000	3.677
8000	4.069
7000	3.760
6000	3.410
5000	3.015
4000	2.605
5000	2.929
6000	3.295
7000	3.651
8000	4.065
7000	3.719
6000	3.370
5000	3.044
4000	2.637
3500	2.396
3000	2.147
2500	1.877
2000	1.613
2500	1.799
3000	2.020
3500	2.200
4000	2.462
5000	2.833
6000	3.231
7000	3.635
8000	4.045

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3951-84
DATE CALIBRATED: 7-30-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

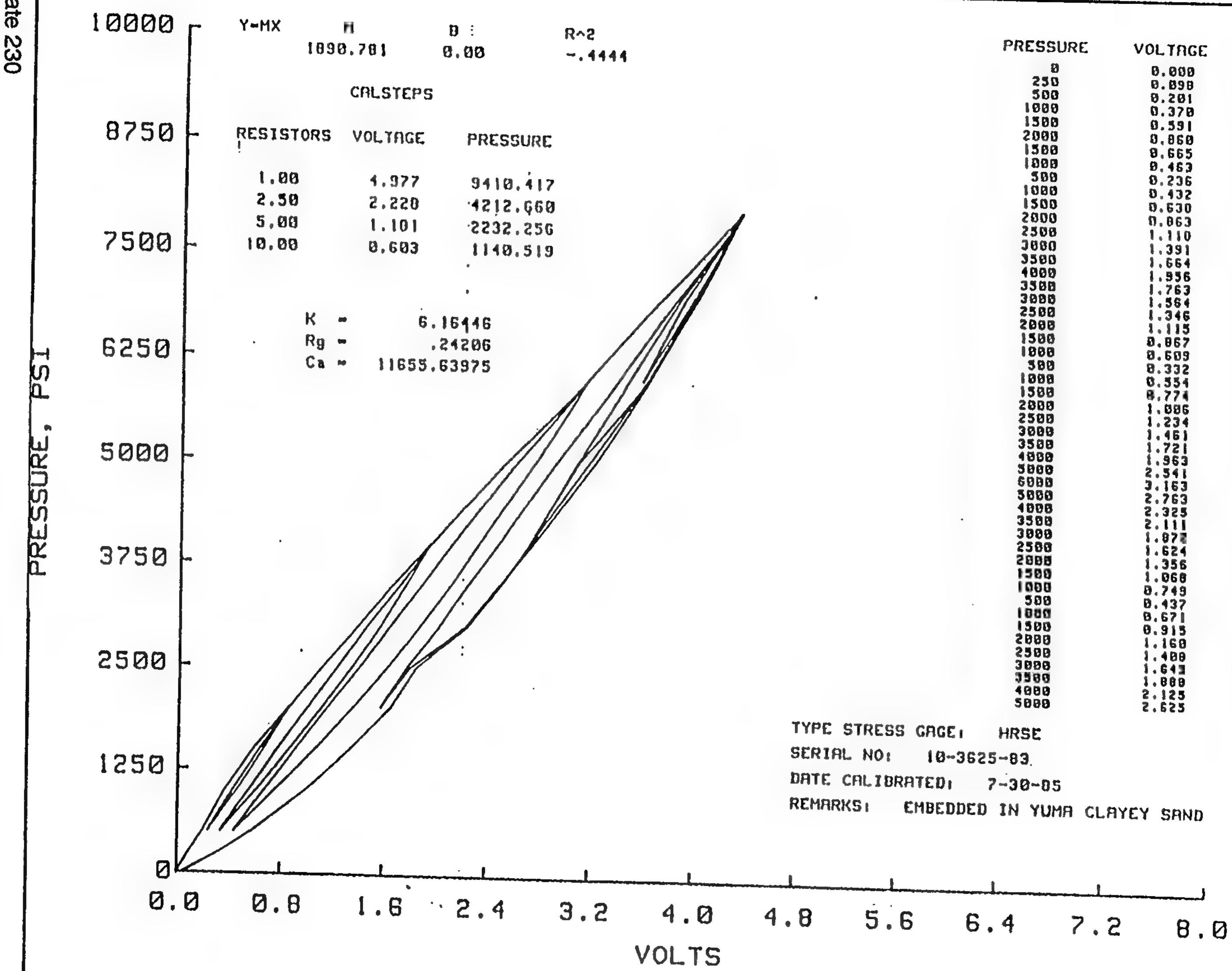
Plate 229

Y=MX M 1890.781 B 0.00 R^2 -.4444

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.977	9410.417
2.50	2.220	4212.660
5.00	1.101	2232.256
10.00	0.603	1140.519

K = 6.16446
Rg = .24206
Ca = 11655.63975

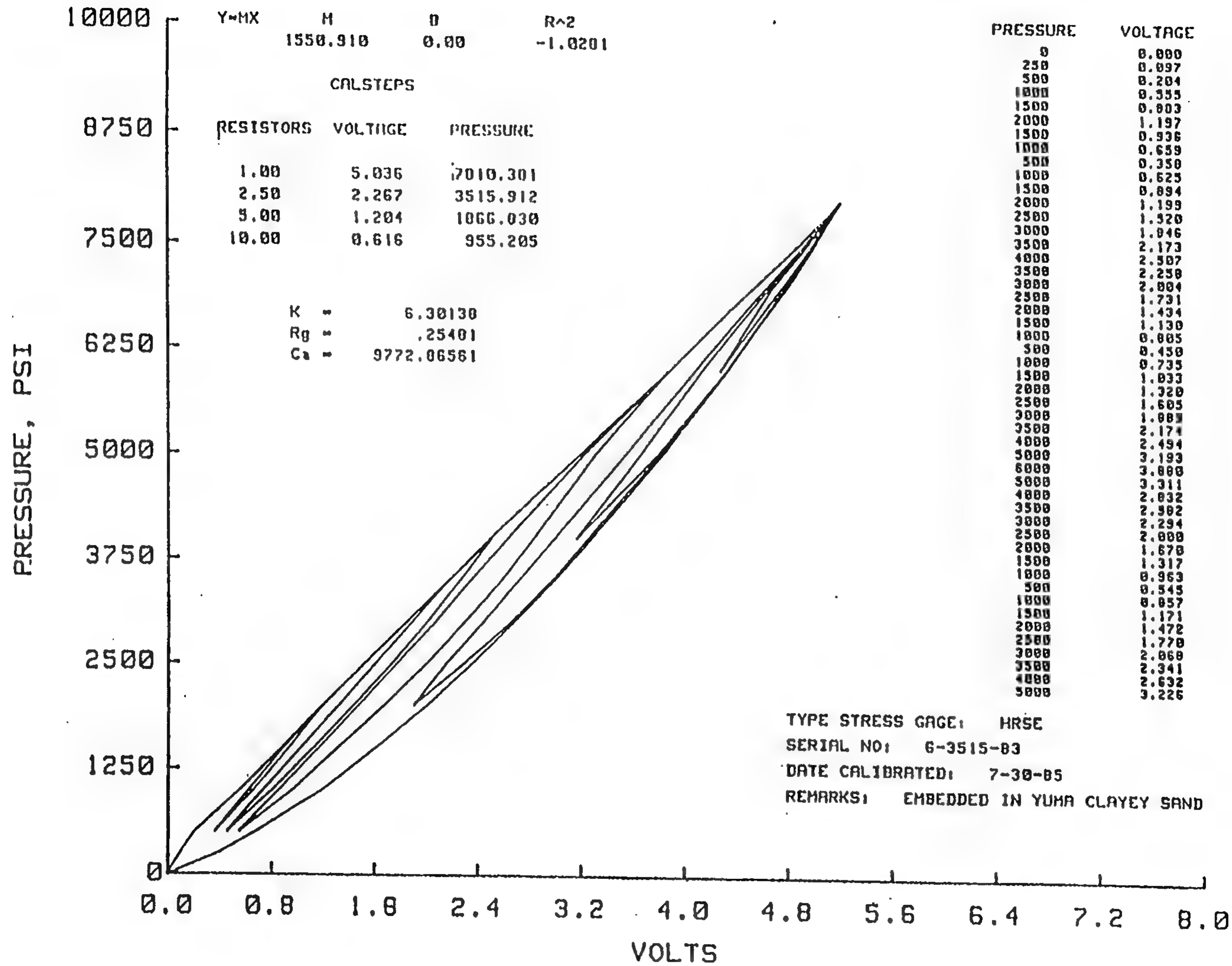


PRESSURE	VOLTAGE
0	0.000
250	0.098
500	0.201
1000	0.370
1500	0.591
2000	0.860
1500	0.665
1000	0.463
500	0.236
1000	0.432
1500	0.630
2000	0.863
2500	1.110
3000	1.391
3500	1.664
4000	1.956
3500	1.763
3000	1.564
2500	1.346
2000	1.115
1500	0.867
1000	0.609
500	0.332
1000	0.554
1500	0.774
2000	1.006
2500	1.234
3000	1.461
3500	1.721
4000	1.963
5000	2.541
6000	3.163
5000	2.763
4000	2.325
3500	2.111
3000	1.872
2500	1.624
2000	1.356
1500	1.060
1000	0.749
500	0.437
1000	0.671
1500	0.915
2000	1.160
2500	1.400
3000	1.643
3500	1.880
4000	2.125
5000	2.625

PRESSURE	VOLTAGE
6000	3.161
7000	3.749
8000	4.347
7000	3.905
6000	3.580
7000	3.923
8000	4.352
7000	4.004
6000	3.619
5000	3.170
4000	2.719
5000	3.090
6000	3.402
7000	3.800
8000	4.355
7000	4.017
6000	3.637
5000	3.225
4000	2.745
3500	2.470
3000	2.220
2500	1.803
2000	1.570
2500	1.777
3000	2.023
3500	2.240
4000	2.479
5000	2.924
6000	3.390
7000	3.863
8000	4.356
7000	4.001
6000	3.630
5000	3.095
4000	2.710
3500	2.493
3000	2.238
2500	1.850
2000	1.650
1500	1.336
1000	0.908
500	0.569
250	0.324
0	0.039

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3625-83
DATE CALIBRATED: 7-30-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

Plate 230



Y=MX	M	B	R^2
	1550.910	0.00	-1.0201

CALSTEPS

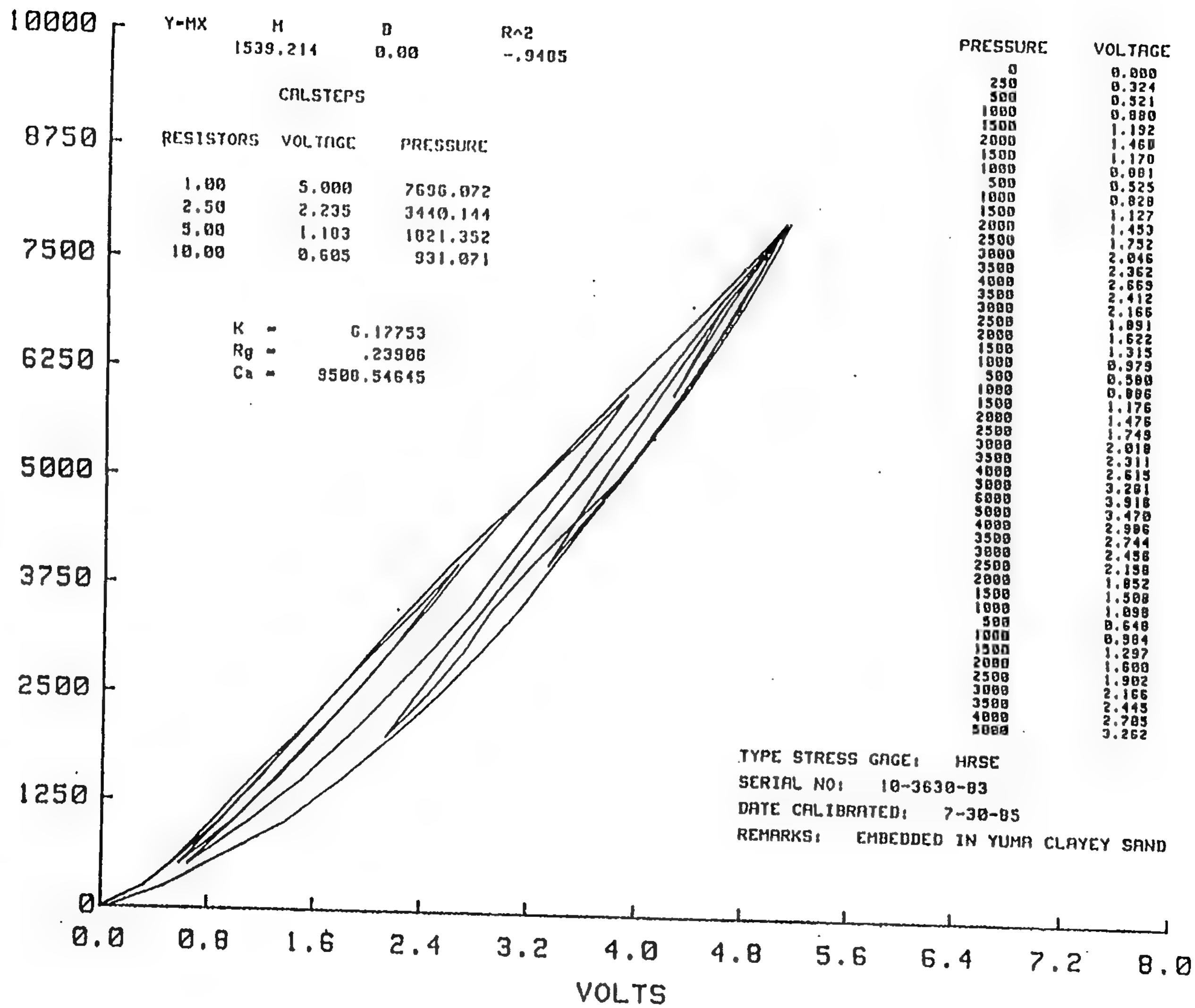
RESISTORS	VOLTAGE	PRESSURE
1.00	5.036	7010.301
2.50	2.267	3515.912
5.00	1.204	1066.030
10.00	0.616	955.205

K = 6.30130
Rg = .25401
Ca = 9772.06561

PRESSURE	VOLTAGE
0	0.000
250	0.097
500	0.204
1000	0.355
1500	0.803
2000	1.197
1500	0.936
1000	0.659
500	0.350
1000	0.625
1500	0.894
2000	1.199
2500	1.520
3000	1.846
3500	2.173
4000	2.507
3500	2.258
3000	2.004
2500	1.731
2000	1.434
1500	1.130
1000	0.805
500	0.450
1000	0.735
1500	1.033
2000	1.320
2500	1.605
3000	1.883
3500	2.174
4000	2.494
5000	3.193
6000	3.880
5000	3.311
4000	2.832
3500	2.502
3000	2.294
2500	2.000
2000	1.670
1500	1.317
1000	0.963
500	0.545
1000	0.857
1500	1.171
2000	1.472
2500	1.770
3000	2.060
3500	2.341
4000	2.632
5000	3.226

PRESSURE	VOLTAGE
6000	3.806
7000	4.542
8000	5.213
7000	4.755
6000	4.200
7000	4.606
8000	5.215
7000	4.701
6000	4.326
5000	3.791
4000	3.162
5000	3.659
6000	4.137
7000	4.664
8000	5.215
7000	4.797
6000	4.334
5000	3.806
4000	3.250
3500	2.970
3000	2.633
2500	2.289
2000	1.899
2500	2.153
3000	2.439
3500	2.716
4000	2.992
5000	3.544
6000	4.084
7000	4.637
8000	5.203
7000	4.797
6000	4.334
5000	3.833
4000	3.278
3500	2.993
3000	2.680
2500	2.351
2000	2.002
1500	1.680
1000	1.191
500	0.673
250	0.393
0	0.009

TYPE STRESS GAGE: HRSE
SERIAL NO: 6-3515-83
DATE CALIBRATED: 7-30-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND



Y=MX	M	B	R^2
	1539.214	0.00	-.9405

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.000	7696.072
2.50	2.235	3440.144
5.00	1.103	1021.352
10.00	0.605	931.071

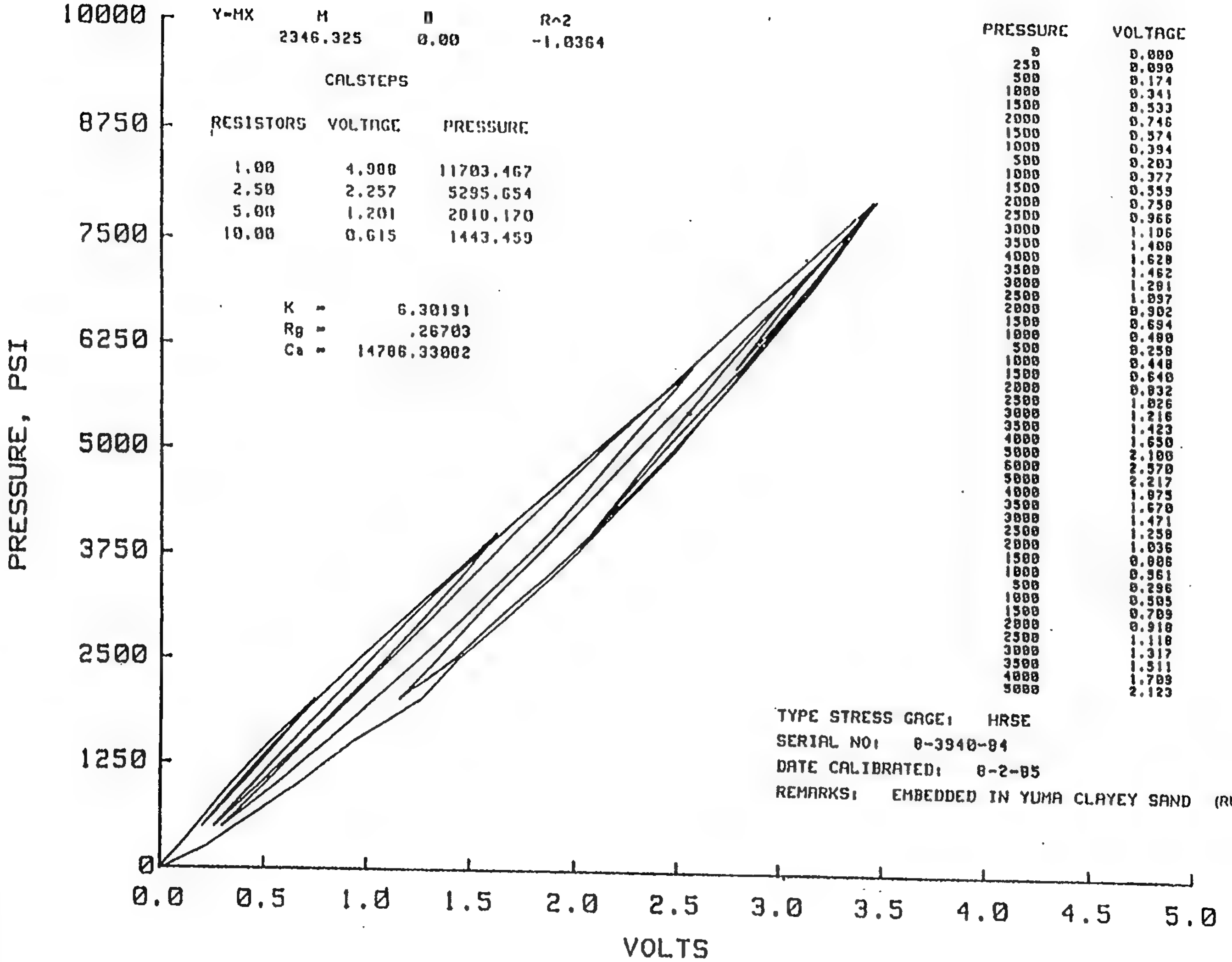
K = 6.17753
Rg = .23906
Ca = 9500.54645

PRESSURE	VOLTAGE
0	0.000
250	0.324
500	0.521
1000	0.880
1500	1.192
2000	1.460
1500	1.170
1000	0.881
500	0.525
1000	0.828
1500	1.127
2000	1.453
2500	1.752
3000	2.046
3500	2.362
4000	2.669
3500	2.412
3000	2.166
2500	1.891
2000	1.622
1500	1.315
1000	0.979
500	0.580
1000	0.886
1500	1.176
2000	1.476
2500	1.749
3000	2.018
3500	2.311
4000	2.615
5000	3.281
6000	3.918
5000	3.470
4000	2.986
3500	2.744
3000	2.458
2500	2.158
2000	1.852
1500	1.508
1000	1.098
500	0.648
1000	0.984
1500	1.297
2000	1.600
2500	1.902
3000	2.166
3500	2.445
4000	2.785
5000	3.262

PRESSURE	VOLTAGE
6000	3.863
7000	4.501
8000	5.100
7000	4.651
6000	4.255
7000	4.613
8000	5.103
7000	4.741
6000	4.310
5000	3.047
4000	3.335
5000	3.732
6000	4.157
7000	4.600
8000	5.135
7000	4.770
6000	4.344
5000	3.840
4000	3.215
3500	2.922
3000	2.705
2500	2.440
2000	2.130
2500	2.362
3000	2.596
3500	2.857
4000	3.099
5000	3.593
6000	4.082
7000	4.566
8000	5.184
7000	4.721
6000	4.336
5000	3.860
4000	3.371
3500	3.123
3000	2.833
2500	2.527
2000	2.183
1500	1.880
1000	1.375
500	0.776
250	0.482
0	0.054

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3630-83
DATE CALIBRATED: 7-30-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND

Plate 232



Y=MX	M	B	R^2
	2346.325	0.00	-1.0364

CALSTEPS

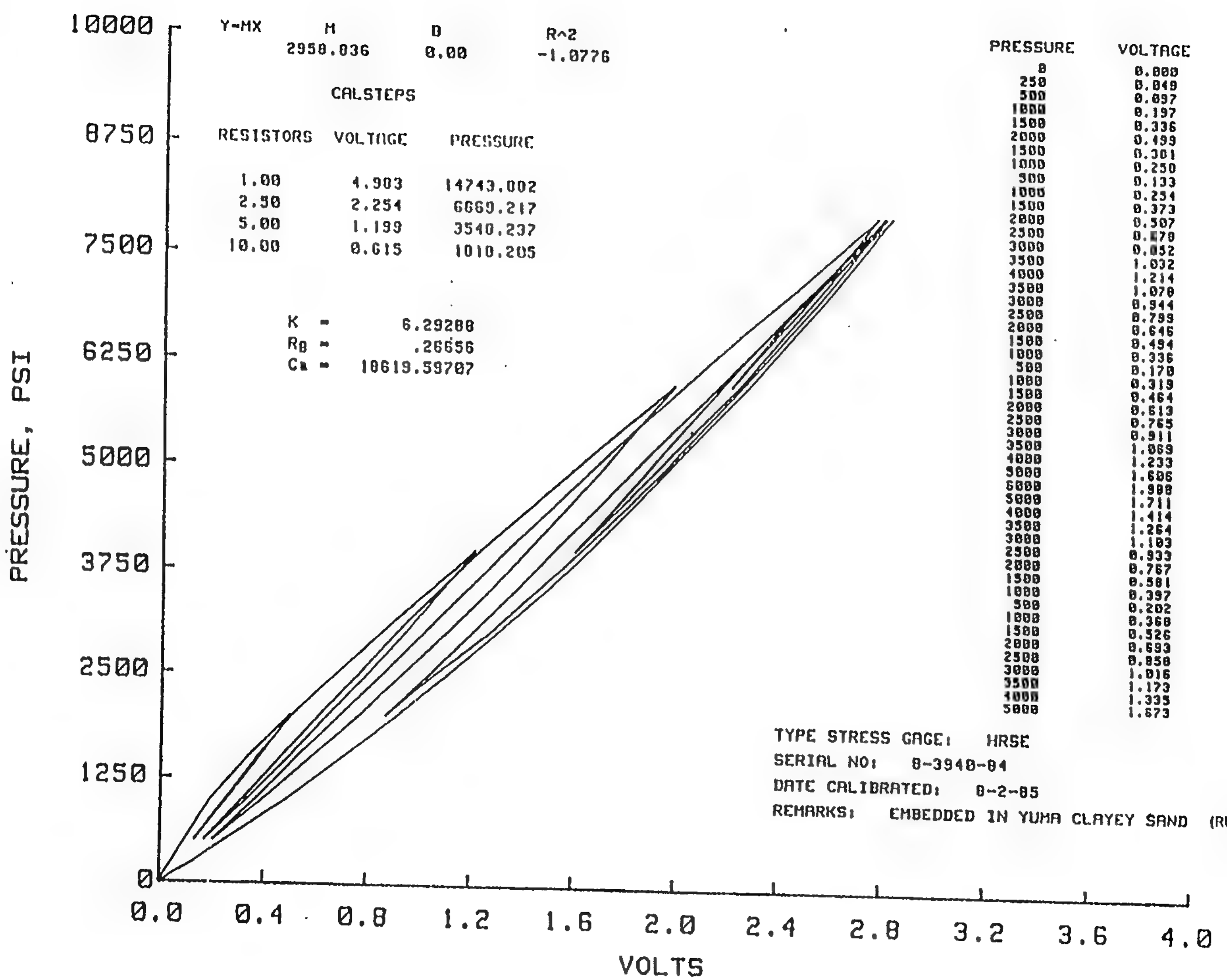
RESISTORS	VOLTAGE	PRESSURE
1.00	4.900	11703.467
2.50	2.257	5295.654
5.00	1.201	2010.170
10.00	0.615	1443.459

K = 6.30191
Rg = .26703
Ca = 14786.33002

PRESSURE	VOLTAGE
0	0.000
250	0.090
500	0.174
1000	0.341
1500	0.533
2000	0.746
1500	0.574
1000	0.394
500	0.203
1000	0.377
1500	0.559
2000	0.758
2500	0.966
3000	1.106
3500	1.400
4000	1.628
3500	1.462
3000	1.281
2500	1.097
2000	0.902
1500	0.694
1000	0.480
500	0.258
1000	0.448
1500	0.640
2000	0.832
2500	1.026
3000	1.216
3500	1.423
4000	1.650
5000	2.100
6000	2.570
5000	2.217
4000	1.875
3500	1.670
3000	1.471
2500	1.258
2000	1.036
1500	0.886
1000	0.561
500	0.296
1000	0.505
1500	0.709
2000	0.918
2500	1.118
3000	1.317
3500	1.511
4000	1.709
5000	2.123

PRESSURE	VOLTAGE
6000	2.555
7000	3.001
8000	3.456
7000	3.142
6000	2.785
7000	3.090
0000	3.457
7000	3.140
6000	2.807
5000	2.424
4000	2.076
5000	2.396
0000	2.727
7000	3.000
8000	3.474
7000	3.171
6000	2.837
5000	2.472
4000	2.078
3500	1.865
3000	1.636
2500	1.425
2000	1.156
2500	1.346
3000	1.525
3500	1.718
4000	1.919
5000	2.295
6000	2.687
7000	3.074
8000	3.473
7000	3.164
6000	2.822
5000	2.486
4000	2.097
3500	1.892
3000	1.675
2500	1.445
2000	1.262
1500	0.935
1000	0.666
500	0.358
250	0.214
0	0.013

TYPE STRESS GAGE: HRSE
SERIAL NO: 0-3940-84
DATE CALIBRATED: 8-2-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #1)



Y-MX	M	B	R^2
	2958.836	0.00	-1.0776

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.903	14743.002
2.50	2.254	6669.217
5.00	1.199	3540.237
10.00	0.615	1010.205

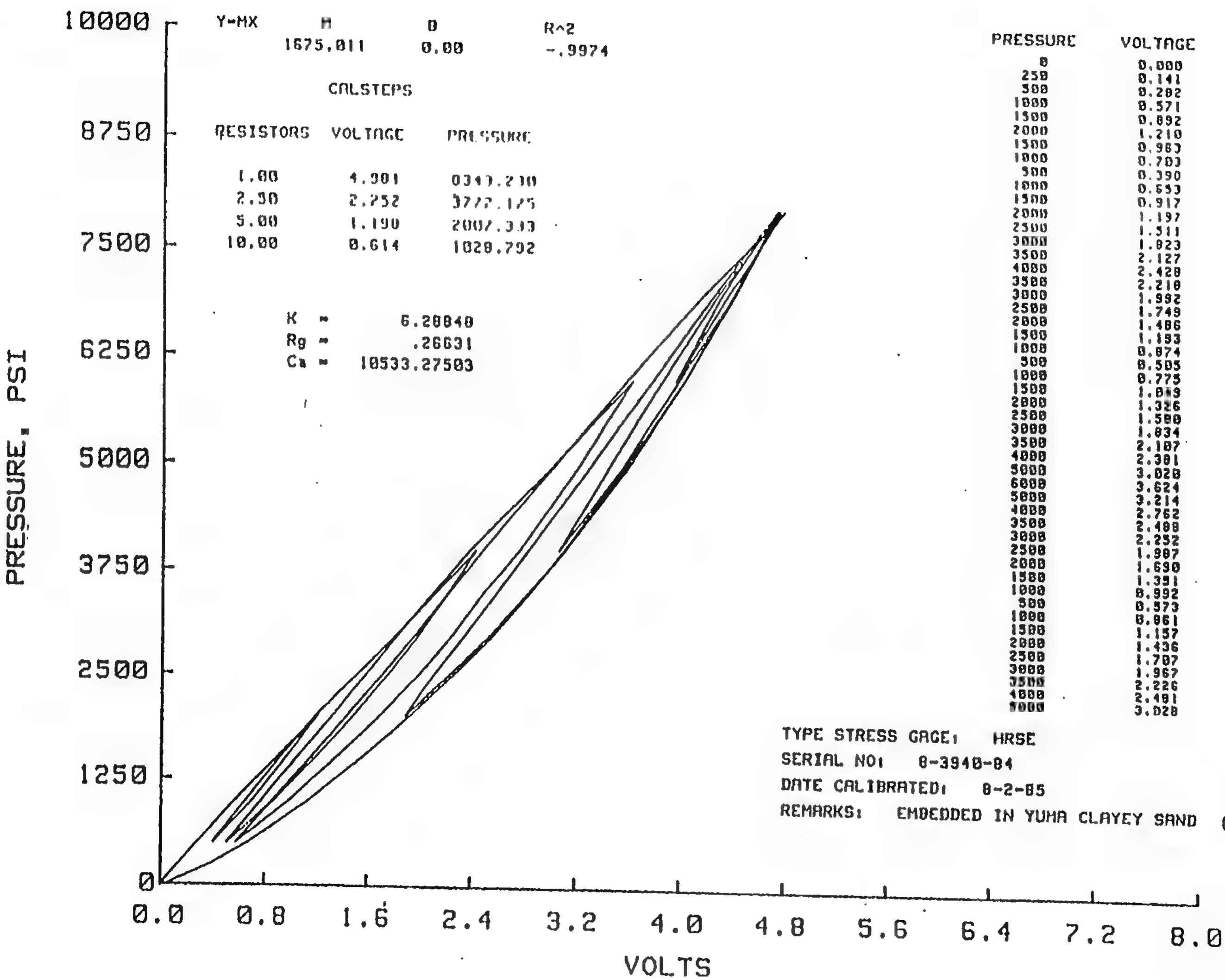
K = 6.29288
Rg = .26656
Ca = 10619.59707

PRESSURE	VOLTAGE
0	0.000
250	0.049
500	0.097
1000	0.197
1500	0.336
2000	0.499
1500	0.301
1000	0.250
500	0.133
1000	0.254
1500	0.373
2000	0.507
2500	0.670
3000	0.852
3500	1.032
4000	1.214
3500	1.070
3000	0.944
2500	0.799
2000	0.646
1500	0.494
1000	0.336
500	0.170
1000	0.319
1500	0.464
2000	0.613
2500	0.765
3000	0.911
3500	1.069
4000	1.233
5000	1.606
6000	1.900
5000	1.711
4000	1.414
3500	1.264
3000	1.103
2500	0.933
2000	0.767
1500	0.581
1000	0.397
500	0.202
1000	0.360
1500	0.526
2000	0.693
2500	0.850
3000	1.016
3500	1.173
4000	1.335
5000	1.673

PRESSURE	VOLTAGE
6000	2.026
7000	2.400
8000	2.776
7000	2.501
6000	2.214
7000	2.400
0000	2.799
7000	2.521
6000	2.244
5000	1.924
4000	1.600
5000	1.891
6000	2.177
7000	2.477
0000	2.809
7000	2.542
6000	2.257
5000	1.953
4000	1.621
3500	1.444
3000	1.267
2500	1.058
2000	0.860
2500	1.037
3000	1.200
3500	1.364
4000	1.518
5000	1.837
6000	2.163
7000	2.400
8000	2.831
7000	2.563
6000	2.200
5000	1.960
4000	1.651
3500	1.481
3000	1.296
2500	1.108
2000	0.913
1500	0.700
1000	0.400
500	0.240
250	0.135
0	0.002

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-2-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #2)

Plate 234



Y=MX	M	B	R^2
	1675.011	0.00	-.9974

CALSTEPS

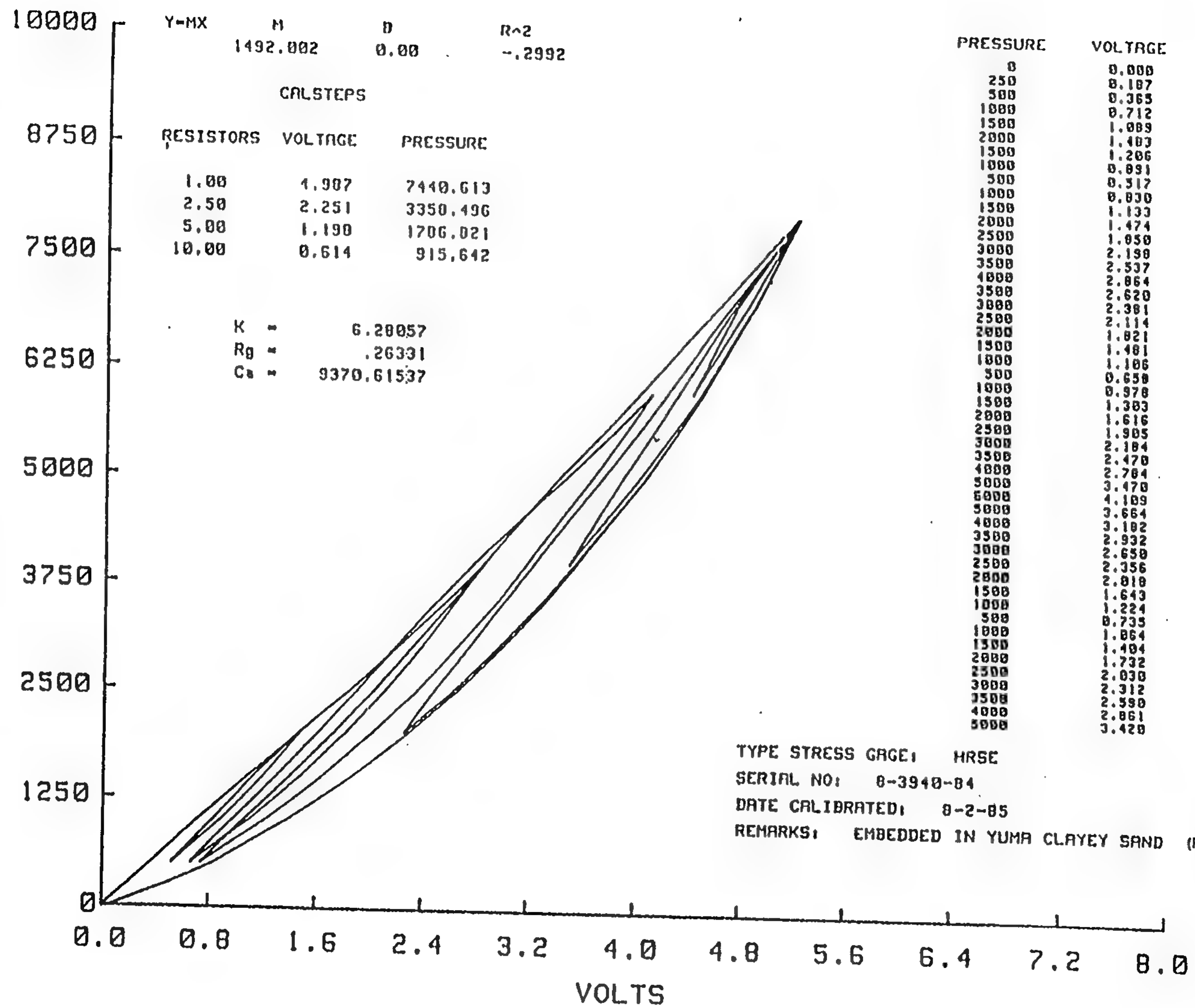
RESISTORS	VOLTAGE	PRESSURE
1.00	4.901	0341.210
2.50	2.252	3772.175
5.00	1.190	2007.313
10.00	0.614	1028.792

K = 6.28840
Rg = .26631
Ca = 10533.27503

PRESSURE	VOLTAGE
0	0.000
250	0.141
500	0.282
1000	0.571
1500	0.892
2000	1.210
1500	0.983
1000	0.703
500	0.390
1000	0.653
1500	0.917
2000	1.197
2500	1.511
3000	1.823
3500	2.127
4000	2.428
3500	2.218
3000	1.992
2500	1.749
2000	1.486
1500	1.193
1000	0.874
500	0.505
1000	0.775
1500	1.049
2000	1.326
2500	1.580
3000	1.834
3500	2.107
4000	2.381
5000	3.028
6000	3.624
5000	3.214
4000	2.762
3500	2.488
3000	2.252
2500	1.987
2000	1.690
1500	1.351
1000	0.992
500	0.573
1000	0.861
1500	1.157
2000	1.436
2500	1.707
3000	1.967
3500	2.226
4000	2.481
5000	3.028

PRESSURE	VOLTAGE
6000	3.581
7000	4.159
8000	4.791
7000	4.347
6000	3.952
7000	4.303
8000	4.740
7000	4.391
6000	3.973
5000	3.552
4000	3.062
5000	3.449
6000	3.849
7000	4.270
8000	4.754
7000	4.407
6000	4.016
5000	3.599
4000	3.109
3500	2.830
3000	2.540
2500	2.221
2000	1.887
2500	2.105
3000	2.349
3500	2.592
4000	2.830
5000	3.303
6000	3.775
7000	4.248
8000	4.732
7000	4.393
6000	4.015
5000	3.572
4000	3.096
3500	2.845
3000	2.567
2500	2.256
2000	1.922
1500	1.547
1000	1.142
500	0.667
250	0.387
0	0.040

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-2-85
REMARKS: EMBEDDED IN YUHA CLAYEY SAND (RUN #3)



Y=MX	M	B	R^2
	1492.002	0.00	-.2992

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.907	7440.613
2.50	2.251	3350.496
5.00	1.190	1706.021
10.00	0.614	915.642

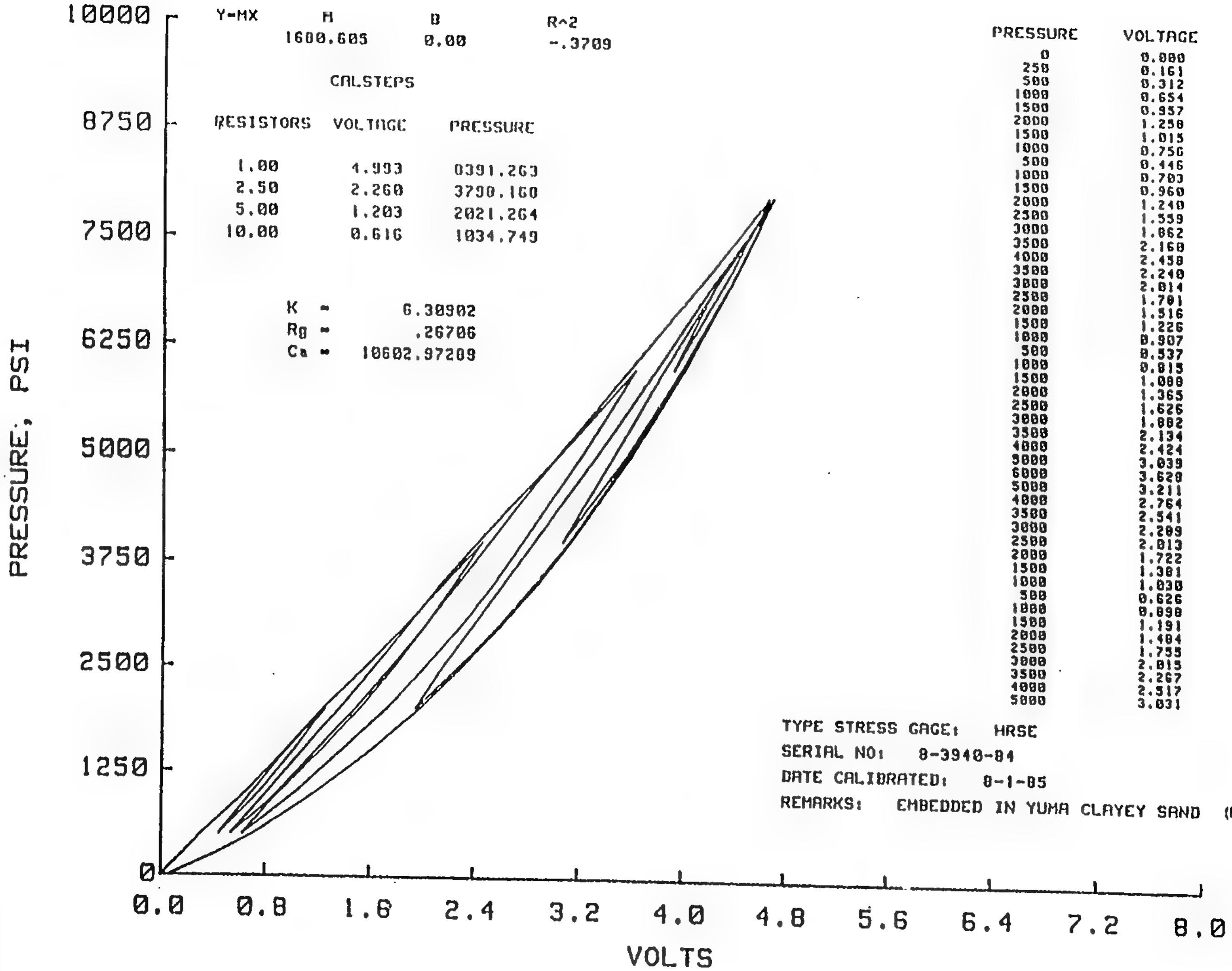
K = 6.28057
Rg = .26331
Ca = 9370.61537

PRESSURE	VOLTAGE
0	0.000
250	0.107
500	0.365
1000	0.712
1500	1.089
2000	1.403
1500	1.206
1000	0.891
500	0.317
1000	0.830
1500	1.133
2000	1.474
2500	1.850
3000	2.198
3500	2.537
4000	2.864
3500	2.620
3000	2.381
2500	2.114
2000	1.821
1500	1.481
1000	1.106
500	0.658
1000	0.978
1500	1.303
2000	1.616
2500	1.905
3000	2.184
3500	2.470
4000	2.784
5000	3.470
6000	4.109
5000	3.664
4000	3.182
3500	2.932
3000	2.650
2500	2.356
2000	2.018
1500	1.643
1000	1.224
500	0.735
1000	1.064
1500	1.404
2000	1.732
2500	2.030
3000	2.312
3500	2.590
4000	2.861
5000	3.420

PRESSURE	VOLTAGE
6000	4.017
7000	4.618
8000	5.209
7000	4.833
6000	4.415
7000	4.758
8000	5.211
7000	4.003
6000	4.477
5000	4.011
4000	3.500
5000	3.089
6000	4.309
7000	4.736
8000	5.228
7000	4.888
6000	4.495
5000	4.054
4000	3.540
3500	3.264
3000	2.950
2500	2.631
2000	2.253
2500	2.485
3000	2.743
3500	2.984
4000	3.237
5000	3.738
6000	4.224
7000	4.706
8000	5.227
7000	4.883
6000	4.497
5000	4.062
4000	3.552
3500	3.290
3000	2.990
2500	2.663
2000	2.290
1500	1.866
1000	1.383
500	0.831
250	0.476
0	0.051

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-2-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #4)

Plate 236



Y=MX	M	B	R^2
	1600.605	0.00	-.3709

CALSTEPS

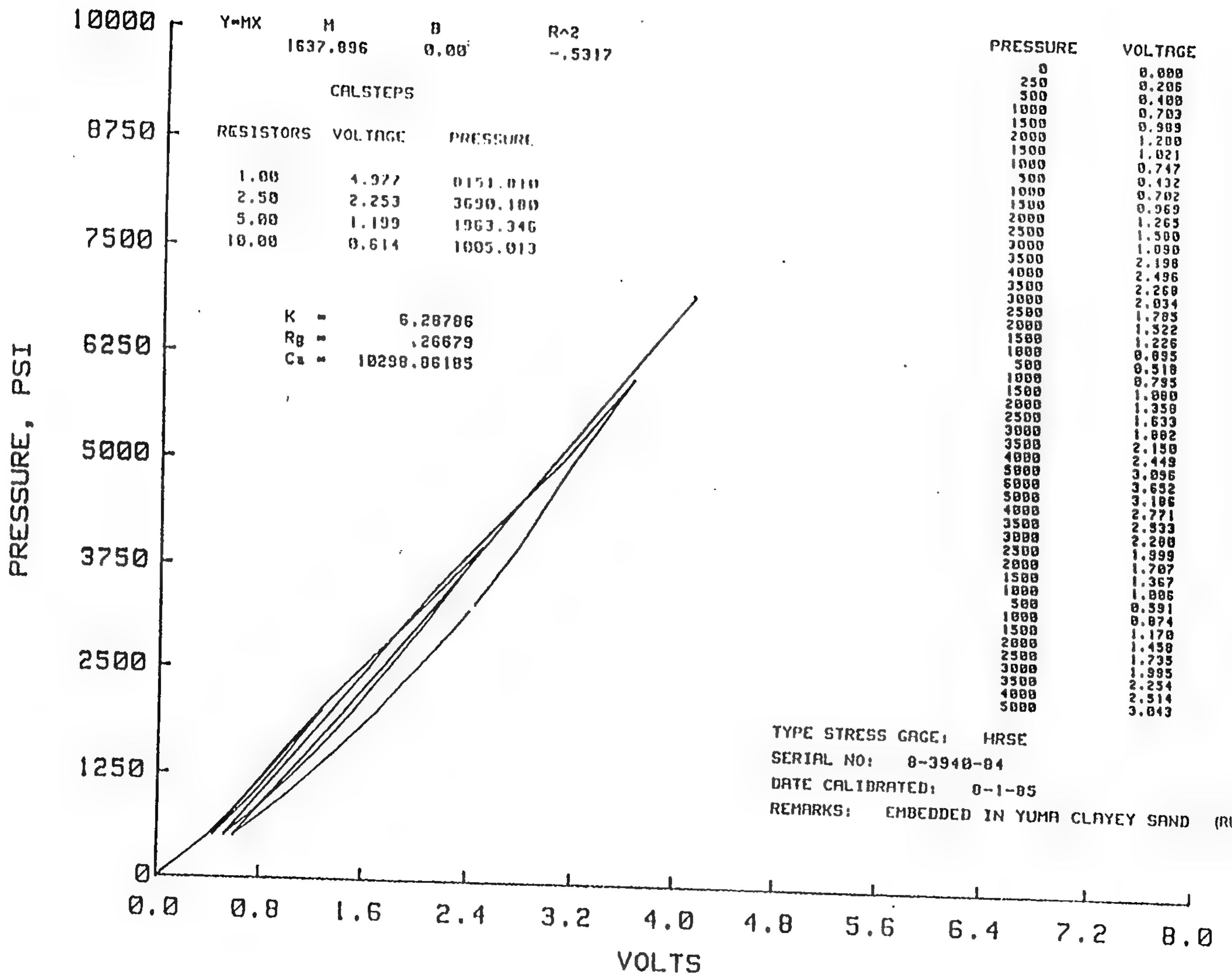
RESISTORS	VOLTAGE	PRESSURE
1.00	4.993	0391.263
2.50	2.260	3790.160
5.00	1.203	2021.264
10.00	0.616	1034.749

K = 6.30902
Rg = .26706
Ca = 10602.97209

PRESSURE	VOLTAGE
0	0.000
250	0.161
500	0.312
1000	0.654
1500	0.957
2000	1.250
1500	1.015
1000	0.756
500	0.446
1000	0.703
1500	0.960
2000	1.240
2500	1.559
3000	1.862
3500	2.160
4000	2.458
3500	2.240
3000	2.014
2500	1.701
2000	1.516
1500	1.226
1000	0.907
500	0.537
1000	0.815
1500	1.088
2000	1.365
2500	1.626
3000	1.882
3500	2.134
4000	2.424
5000	3.039
6000	3.628
5000	3.211
4000	2.764
3500	2.541
3000	2.209
2500	2.013
2000	1.722
1500	1.381
1000	1.030
500	0.626
1000	0.898
1500	1.191
2000	1.484
2500	1.755
3000	2.015
3500	2.267
4000	2.517
5000	3.031

PRESSURE	VOLTAGE
6000	3.579
7000	4.135
8000	4.667
7000	4.316
6000	3.921
7000	4.255
8000	4.694
7000	4.364
6000	3.900
5000	3.556
4000	3.067
5000	3.459
6000	3.846
7000	4.260
8000	4.703
7000	4.366
6000	3.995
5000	3.575
4000	3.117
3500	[illegible].852
3000	2.577
2500	2.271
2000	1.942
2500	2.151
3000	2.382
3500	2.617
4000	2.853
5000	3.327
6000	3.785
7000	4.232
8000	4.703
7000	4.373
6000	4.003
5000	3.595
4000	3.128
3500	2.877
3000	2.593
2500	2.299
2000	1.975
1500	1.602
1000	1.184
500	0.787
250	0.411
0	0.056

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 8-1-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #5)



Y=MX	M	B	R^2
	1637.896	0.00	-.5317

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.977	8151.010
2.50	2.253	3690.180
5.00	1.199	1963.346
10.00	0.614	1005.013

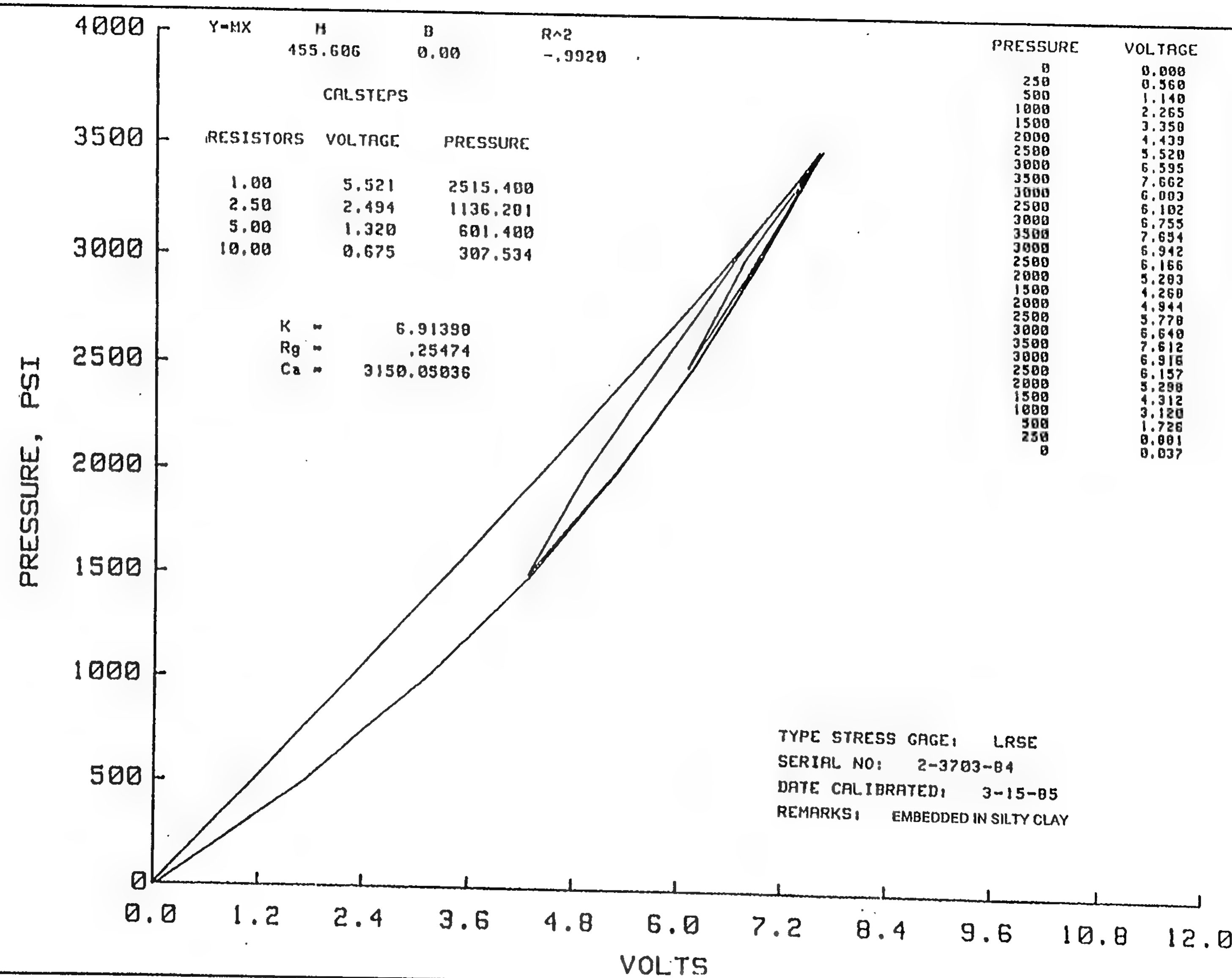
K = 6.28786
Rg = .26679
Cs = 10298.86185

PRESSURE	VOLTAGE
0	0.000
250	0.206
500	0.400
1000	0.703
1500	0.909
2000	1.200
1500	1.021
1000	0.747
500	0.432
1000	0.702
1500	0.969
2000	1.265
2500	1.500
3000	1.890
3500	2.198
4000	2.496
3500	2.260
3000	2.034
2500	1.785
2000	1.522
1500	1.226
1000	0.895
500	0.518
1000	0.795
1500	1.080
2000	1.350
2500	1.633
3000	1.882
3500	2.150
4000	2.449
5000	3.096
6000	3.652
5000	3.186
4000	2.771
3500	2.533
3000	2.280
2500	1.999
2000	1.707
1500	1.367
1000	1.006
500	0.591
1000	0.874
1500	1.170
2000	1.458
2500	1.735
3000	1.995
3500	2.234
4000	2.514
5000	3.043

PRESSURE	VOLTAGE
8000	3.582
7000	4.130

TYPE STRESS GAGE: HRSE
SERIAL NO: 8-3940-84
DATE CALIBRATED: 0-1-85
REMARKS: EMBEDDED IN YUMA CLAYEY SAND (RUN #6)

Plate 238



Y=MX	M	B	R^2
	455.606	0.00	-.9920

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.521	2515.400
2.50	2.494	1136.201
5.00	1.320	601.400
10.00	0.675	307.534

K = 6.91390
Rg = .25474
Ca = 3150.05036

PRESSURE	VOLTAGE
0	0.000
250	0.560
500	1.140
1000	2.265
1500	3.350
2000	4.439
2500	5.520
3000	6.595
3500	7.662
3000	6.003
2500	6.102
3000	6.755
3500	7.654
3000	6.942
2500	6.166
2000	5.203
1500	4.260
2000	4.944
2500	5.778
3000	6.640
3500	7.612
3000	6.916
2500	6.157
2000	5.298
1500	4.312
1000	3.120
500	1.726
250	0.801
0	0.037

TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3703-84
DATE CALIBRATED: 3-15-85
REMARKS: EMBEDDED IN SILTY CLAY

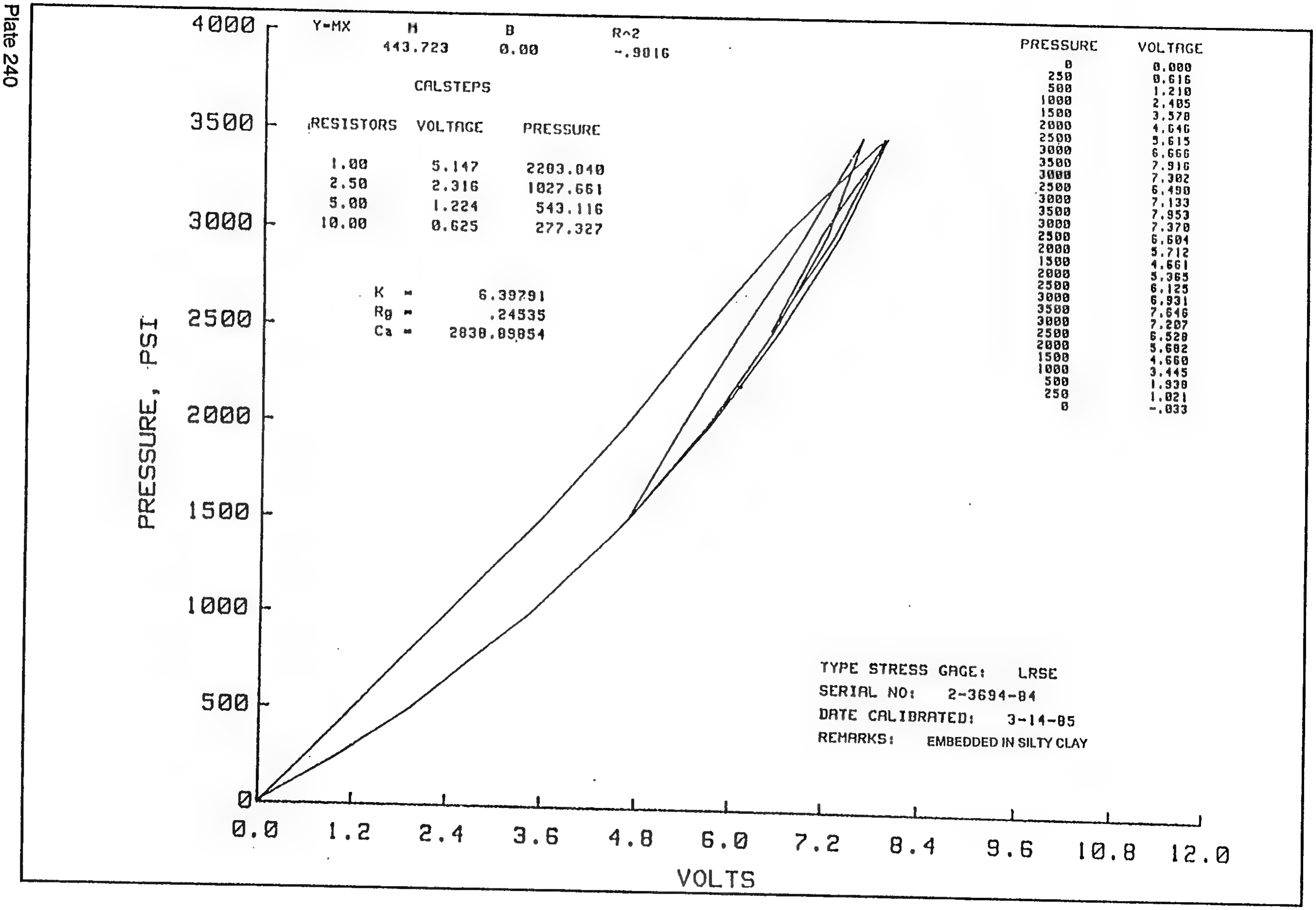

Y=MX
M 443.723
B 0.00
R^2 -.9016
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.147 2203.040
2.50 2.316 1027.661
5.00 1.224 543.116
10.00 0.625 277.327
K = 6.39791
Rg = .24535
Ca = 2838.89854
PRESSURE VOLTAGE
0 0.000
250 0.616
500 1.210
1000 2.405
1500 3.578
2000 4.646
2500 5.615
3000 6.666
3500 7.916
3000 7.302
2500 6.490
3000 7.133
3500 7.953
3000 7.370
2500 6.604
2000 5.712
1500 4.661
2000 5.365
2500 6.125
3000 6.931
3500 7.646
3000 7.207
2500 6.520
2000 5.682
1500 4.660
1000 3.445
500 1.938
250 1.021
0 -.033
TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3694-84
DATE CALIBRATED: 3-14-85
REMARKS: EMBEDDED IN SILTY CLAY
PRESSURE, PSI
4000
3500
3000
2500
2000
1500
1000
500
0
0.0
1.2
2.4
3.6
4.8
6.0
7.2
8.4
9.6
10.8
12.0
VOLTS

Plate 240

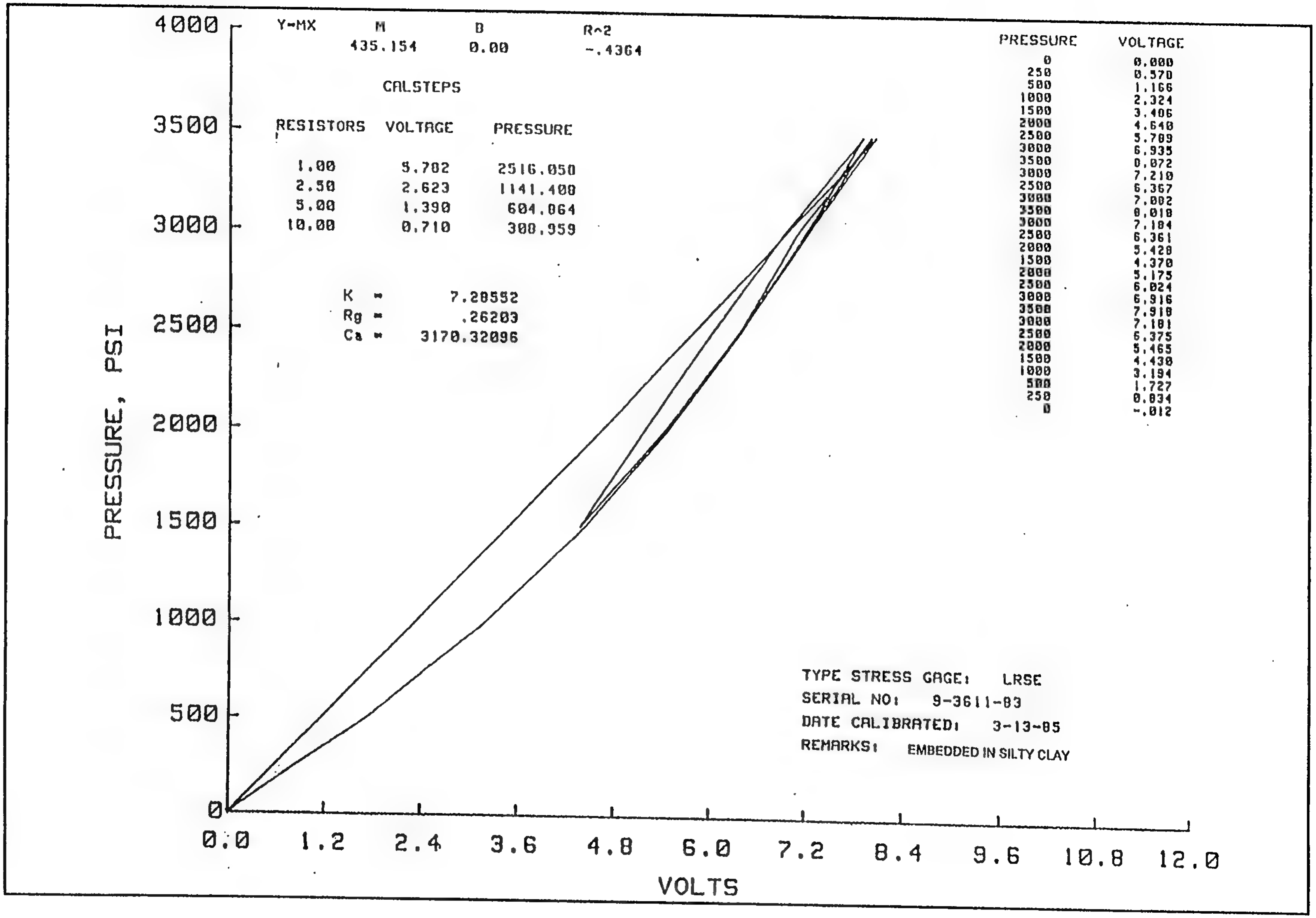
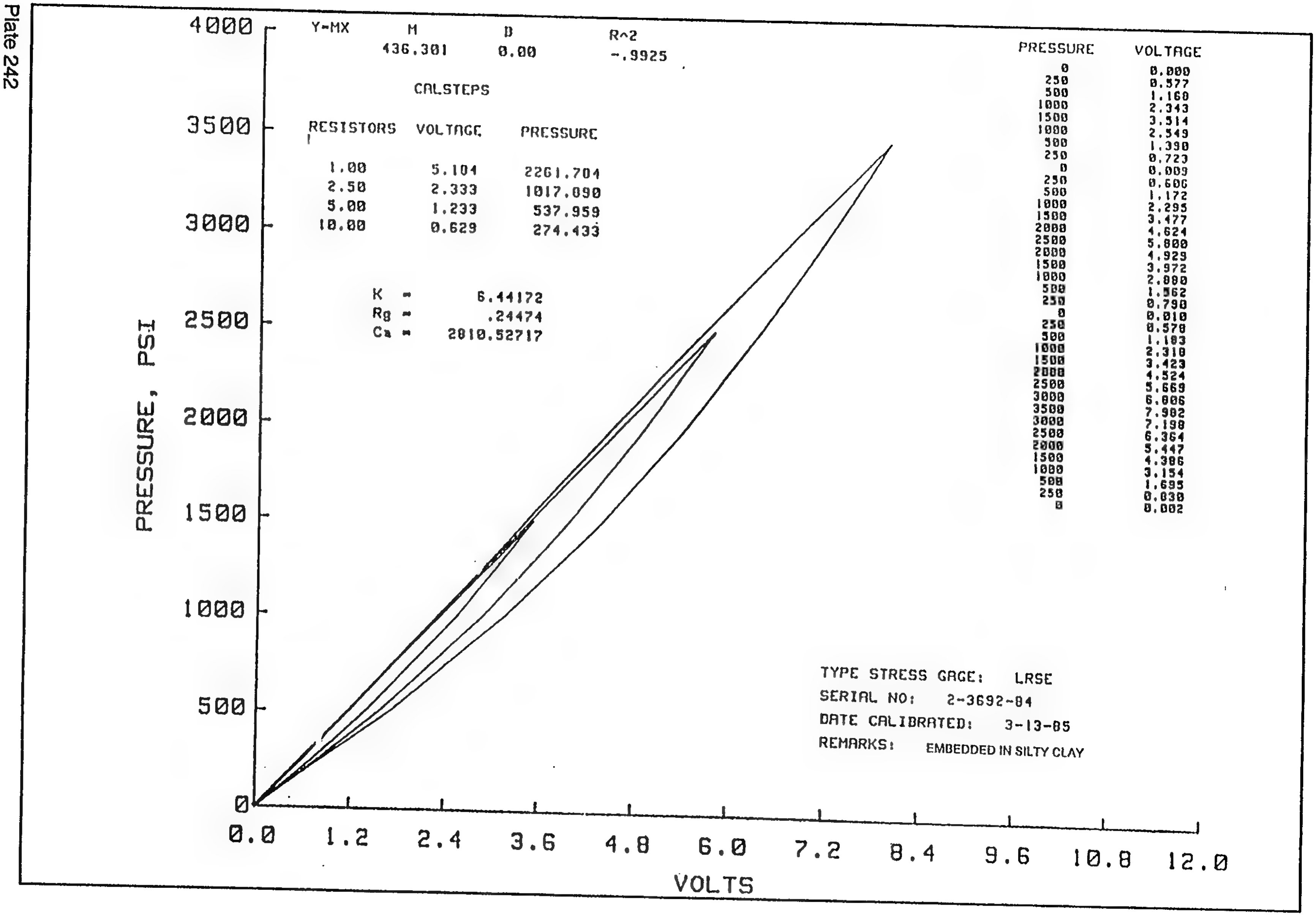

Y-MX
M
435.154
B
0.00
R^2
-.4364
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.702 2516.050
2.50 2.623 1141.400
5.00 1.390 604.064
10.00 0.710 300.959
K = 7.28552
Rg = .26203
Ca = 3170.32096
PRESSURE VOLTAGE
0 0.000
250 0.570
500 1.166
1000 2.324
1500 3.406
2000 4.640
2500 5.789
3000 6.935
3500 8.072
3000 7.210
2500 6.367
3000 7.002
3500 8.018
3000 7.184
2500 6.361
2000 5.428
1500 4.370
2000 5.175
2500 6.024
3000 6.916
3500 7.918
3000 7.181
2500 6.375
2000 5.465
1500 4.430
1000 3.194
500 1.727
250 0.834
0 -.012
TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3611-83
DATE CALIBRATED: 3-13-85
REMARKS: EMBEDDED IN SILTY CLAY
PRESSURE, PSI
0
500
1000
1500
2000
2500
3000
3500
4000
VOLTS
0.0
1.2
2.4
3.6
4.8
6.0
7.2
8.4
9.6
10.8
12.0

Plate 241



M	B	R^2
436.301	0.00	-.9925

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.104	2261.704
2.50	2.333	1017.090
5.00	1.233	537.959
10.00	0.629	274.433

K = 6.44172
Rg = .24474
Ca = 2010.52717

PRESSURE	VOLTAGE
0	0.000
250	0.577
500	1.160
1000	2.343
1500	3.514
1000	2.549
500	1.390
250	0.723
0	0.009
250	0.606
500	1.172
1000	2.295
1500	3.477
2000	4.624
2500	5.800
2000	4.929
1500	3.972
1000	2.880
500	1.562
250	0.790
0	0.010
250	0.578
500	1.183
1000	2.318
1500	3.423
2000	4.524
2500	5.669
3000	6.806
3500	7.982
3000	7.198
2500	6.364
2000	5.447
1500	4.386
1000	3.154
500	1.695
250	0.030
0	0.002

Plate 242

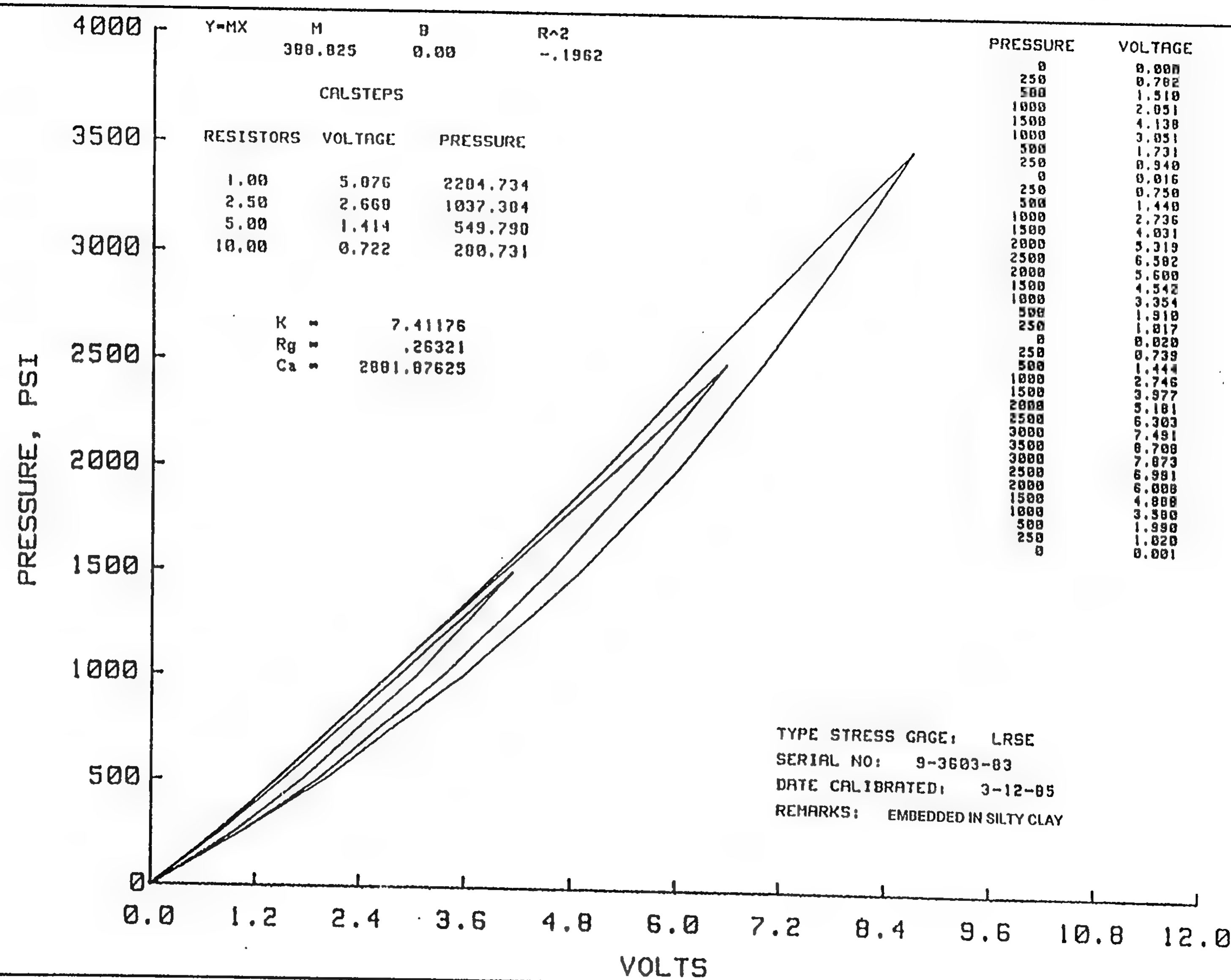
Y=MX	M	B	R^2
	380.825	0.00	-.1962

CALSTEPS

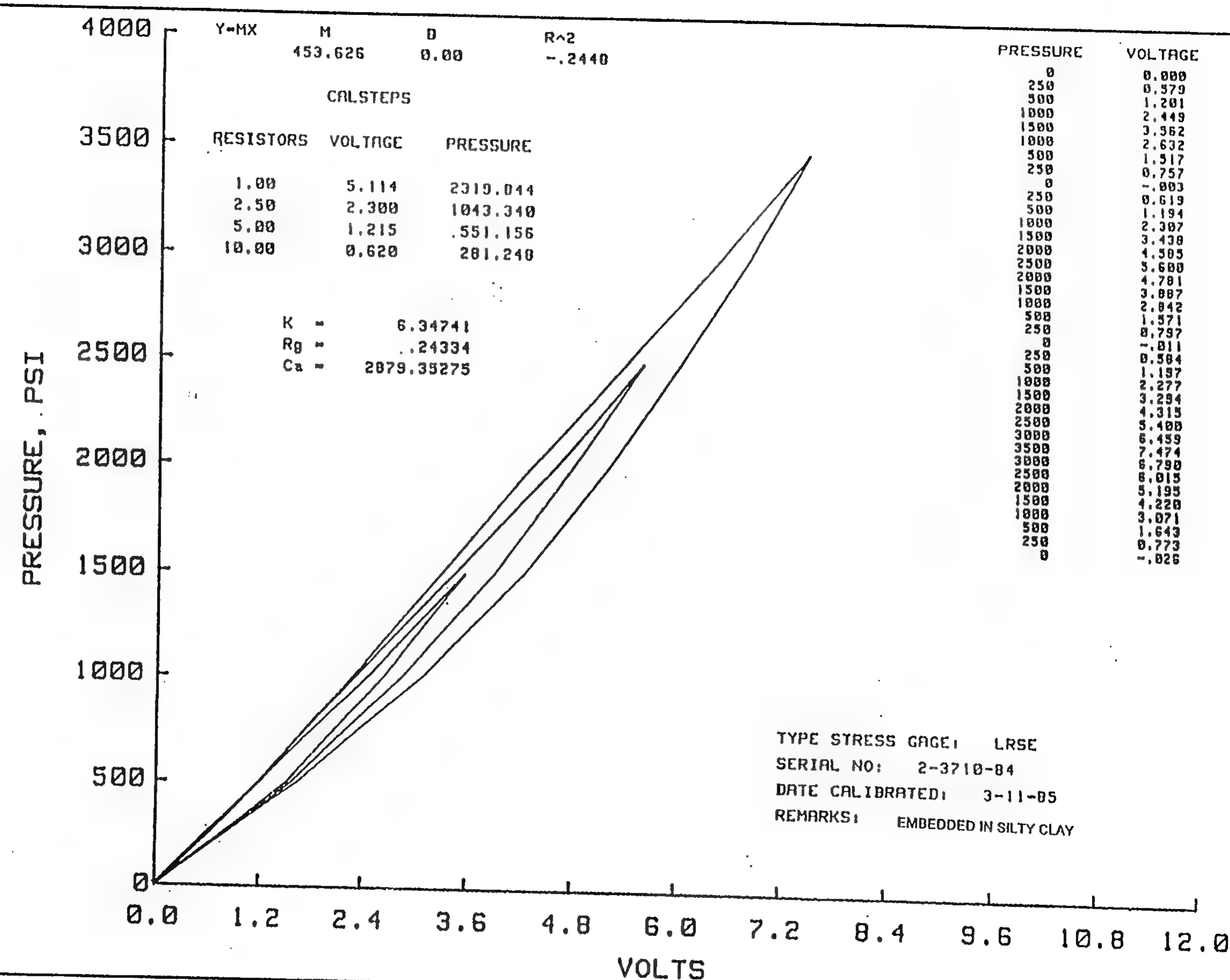
RESISTORS	VOLTAGE	PRESSURE
1.00	5.076	2204.734
2.50	2.660	1037.304
5.00	1.414	549.790
10.00	0.722	280.731

K = 7.41176
Rg = .26321
Ca = 2881.87625

PRESSURE	VOLTAGE
0	0.000
250	0.782
500	1.510
1000	2.051
1500	4.138
1000	3.051
500	1.731
250	0.940
0	0.016
250	0.750
500	1.440
1000	2.736
1500	4.031
2000	5.319
2500	6.582
2000	5.600
1500	4.542
1000	3.354
500	1.910
250	1.017
0	0.020
250	0.739
500	1.444
1000	2.746
1500	3.977
2000	5.181
2500	6.303
3000	7.491
3500	8.708
3000	7.873
2500	6.981
2000	6.008
1500	4.808
1000	3.580
500	1.990
250	1.020
0	0.001



TYPE STRESS GAGE: LRSE
SERIAL NO: 9-3603-83
DATE CALIBRATED: 3-12-85
REMARKS: EMBEDDED IN SILTY CLAY



CALSTEPS

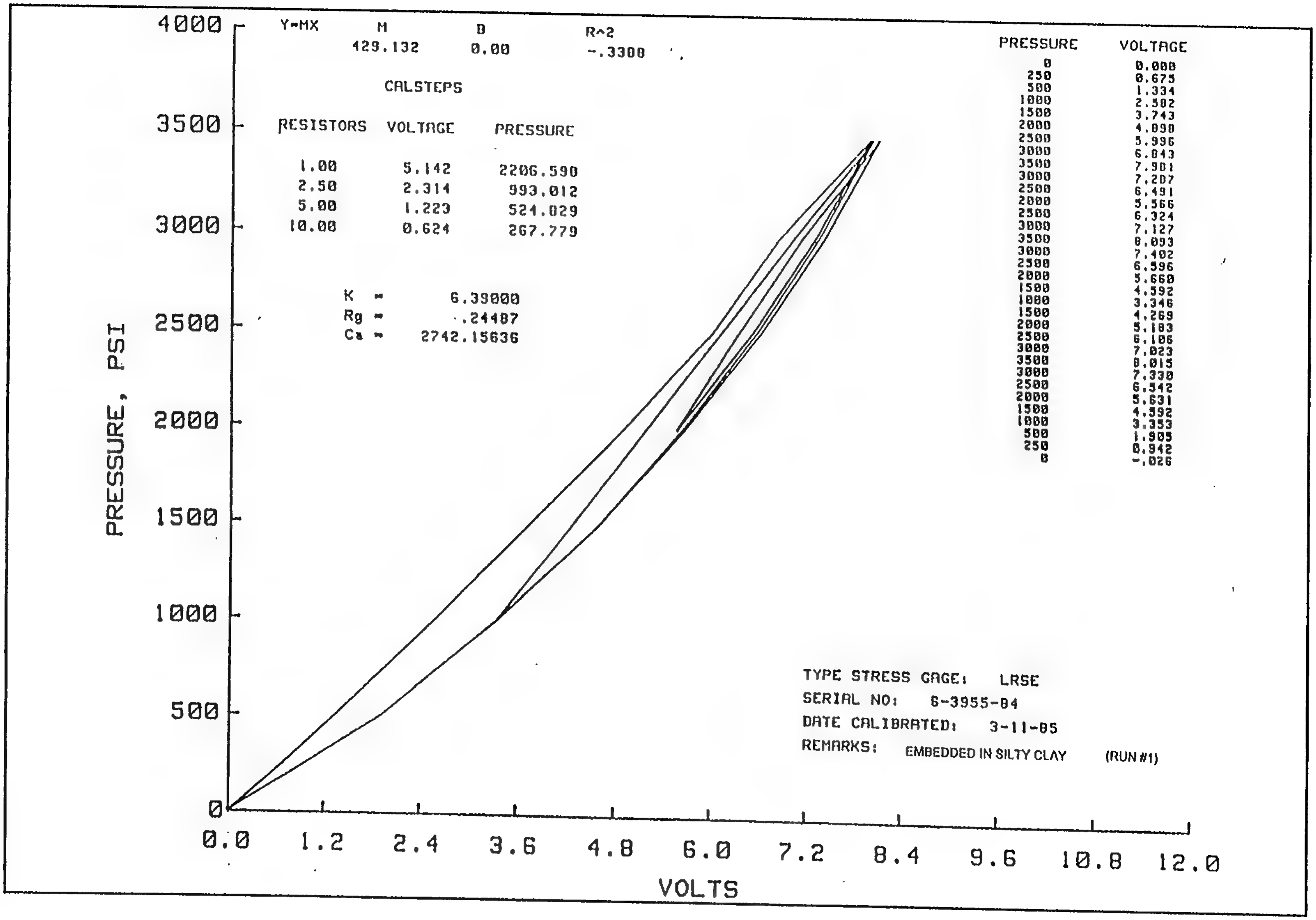
RESISTORS	VOLTAGE	PRESSURE
1.00	5.114	2319.044
2.50	2.300	1043.340
5.00	1.215	551.156
10.00	0.620	281.240

K = 6.34741
Rg = .24334
Ca = 2879.35275

PRESSURE	VOLTAGE
0	0.000
250	0.579
500	1.201
1000	2.449
1500	3.562
1000	2.632
500	1.517
250	0.757
0	-.003
250	0.619
500	1.194
1000	2.307
1500	3.438
2000	4.505
2500	5.600
2000	4.781
1500	3.887
1000	2.842
500	1.571
250	0.797
0	-.011
250	0.584
500	1.197
1000	2.277
1500	3.294
2000	4.315
2500	5.400
3000	6.459
3500	7.474
3000	6.790
2500	6.015
2000	5.195
1500	4.220
1000	3.071
500	1.643
250	0.773
0	-.026

TYPE STRESS GAGE: LRSE
SERIAL NO: 2-3710-84
DATE CALIBRATED: 3-11-85
REMARKS: EMBEDDED IN SILTY CLAY

Plate 244

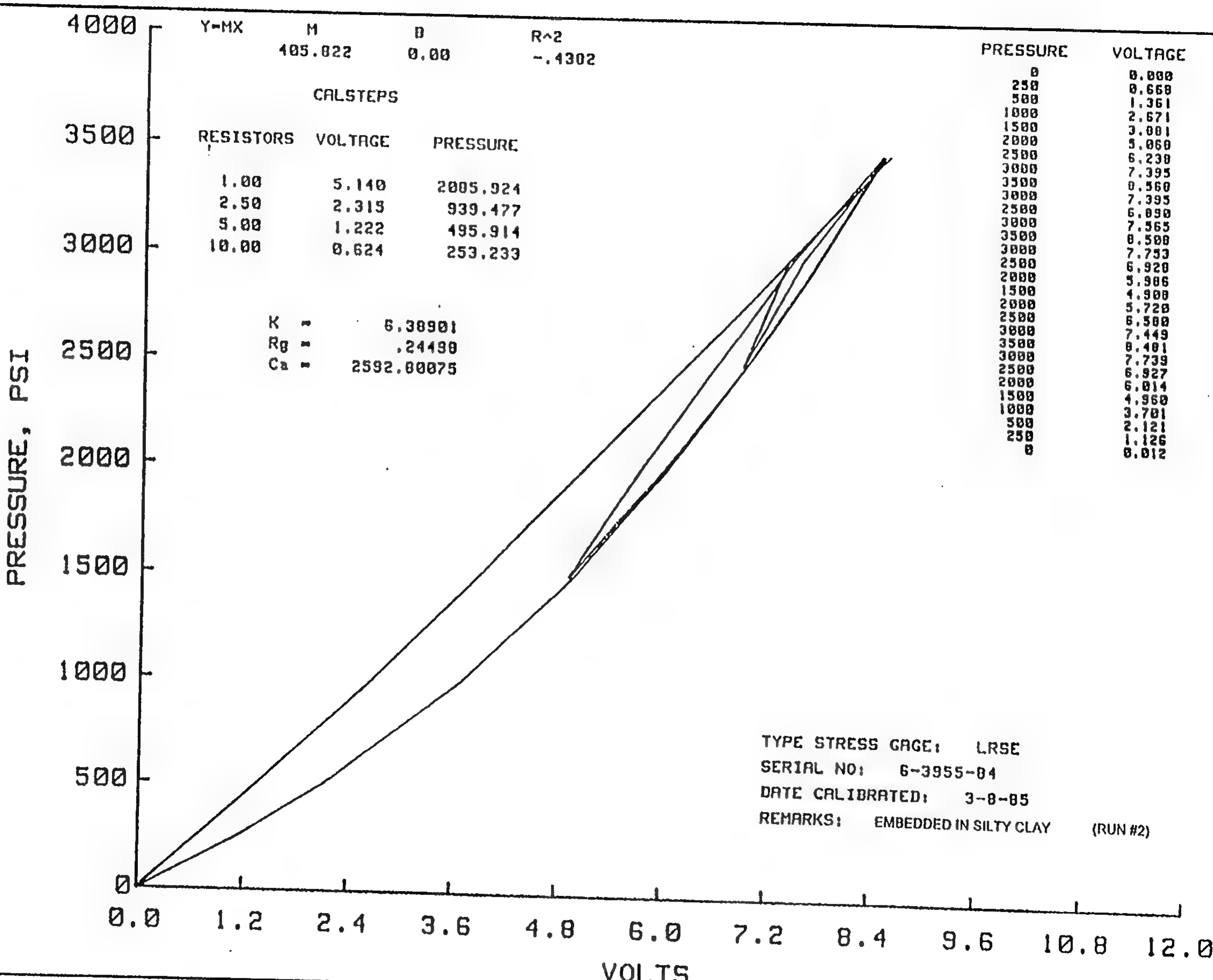


CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.142	2206.590
2.50	2.314	993.012
5.00	1.223	524.029
10.00	0.624	267.779

PRESSURE	VOLTAGE
0	0.000
250	0.675
500	1.334
1000	2.582
1500	3.743
2000	4.890
2500	5.996
3000	6.843
3500	7.901
3000	7.207
2500	6.491
2000	5.566
2500	6.324
3000	7.127
3500	8.093
3000	7.402
2500	6.596
2000	5.660
1500	4.592
1000	3.346
1500	4.269
2000	5.183
2500	6.106
3000	7.023
3500	8.015
3000	7.330
2500	6.542
2000	5.631
1500	4.592
1000	3.353
500	1.905
250	0.942
0	-.026

Plate 245



Y=MX	M	B	R^2
	405.822	0.00	-.4302

CALSTEPS

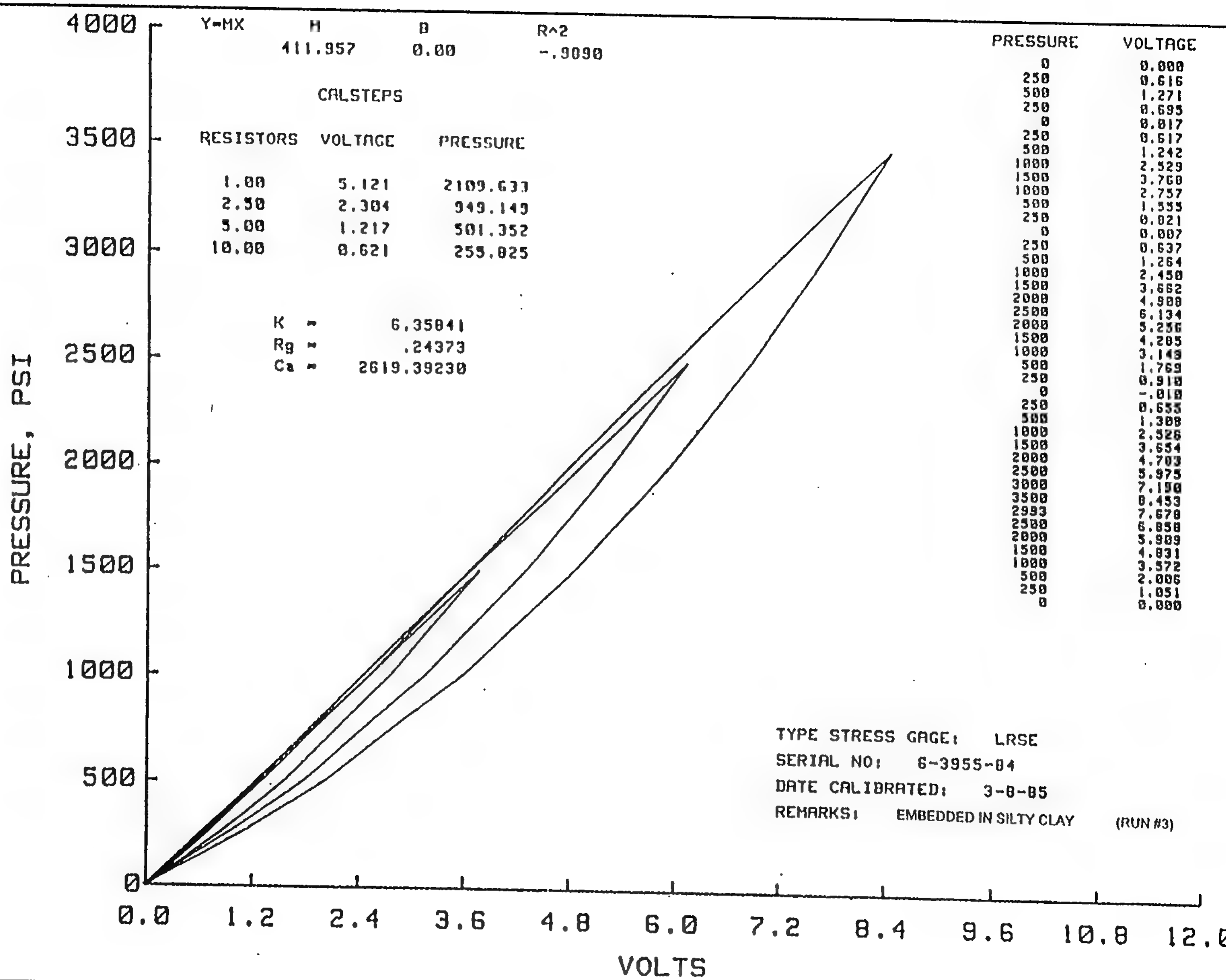
RESISTORS	VOLTAGE	PRESSURE
1.00	5.140	2005.924
2.50	2.315	939.477
5.00	1.222	495.914
10.00	0.624	253.233

K = 6.38901
Rg = .24490
Ca = 2592.80075

PRESSURE	VOLTAGE
0	0.000
250	0.660
500	1.361
1000	2.671
1500	3.881
2000	5.060
2500	6.230
3000	7.395
3500	8.560
3000	7.395
2500	6.090
3000	7.565
3500	8.500
3000	7.753
2500	6.920
2000	5.986
1500	4.900
2000	5.720
2500	6.500
3000	7.449
3500	8.401
3000	7.739
2500	6.927
2000	6.014
1500	4.960
1000	3.701
500	2.121
250	1.126
0	0.012

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 3-8-85
REMARKS: EMBEDDED IN SILTY CLAY (RUN #2)

Plate 246



Y=MX	M	B	R^2
	411.957	0.00	-.9090

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	5.121	2109.633
2.50	2.304	949.149
5.00	1.217	501.352
10.00	0.621	255.825

K = 6.35841
Rg = .24373
Ca = 2619.39230

PRESSURE	VOLTAGE
0	0.000
250	0.616
500	1.271
250	0.695
0	0.017
250	0.617
500	1.242
1000	2.529
1500	3.760
1000	2.757
500	1.555
250	0.021
0	0.007
250	0.637
500	1.264
1000	2.450
1500	3.662
2000	4.900
2500	6.134
2000	5.256
1500	4.205
1000	3.149
500	1.769
250	0.910
0	-.010
250	0.655
500	1.308
1000	2.526
1500	3.654
2000	4.703
2500	5.975
3000	7.150
3500	8.453
2993	7.678
2500	6.858
2000	5.909
1500	4.831
1000	3.572
500	2.006
250	1.051
0	0.000

TYPE STRESS GAGE: LRSE
SERIAL NO: 6-3955-84
DATE CALIBRATED: 3-8-85
REMARKS: EMBEDDED IN SILTY CLAY (RUN #3)

Plate 247

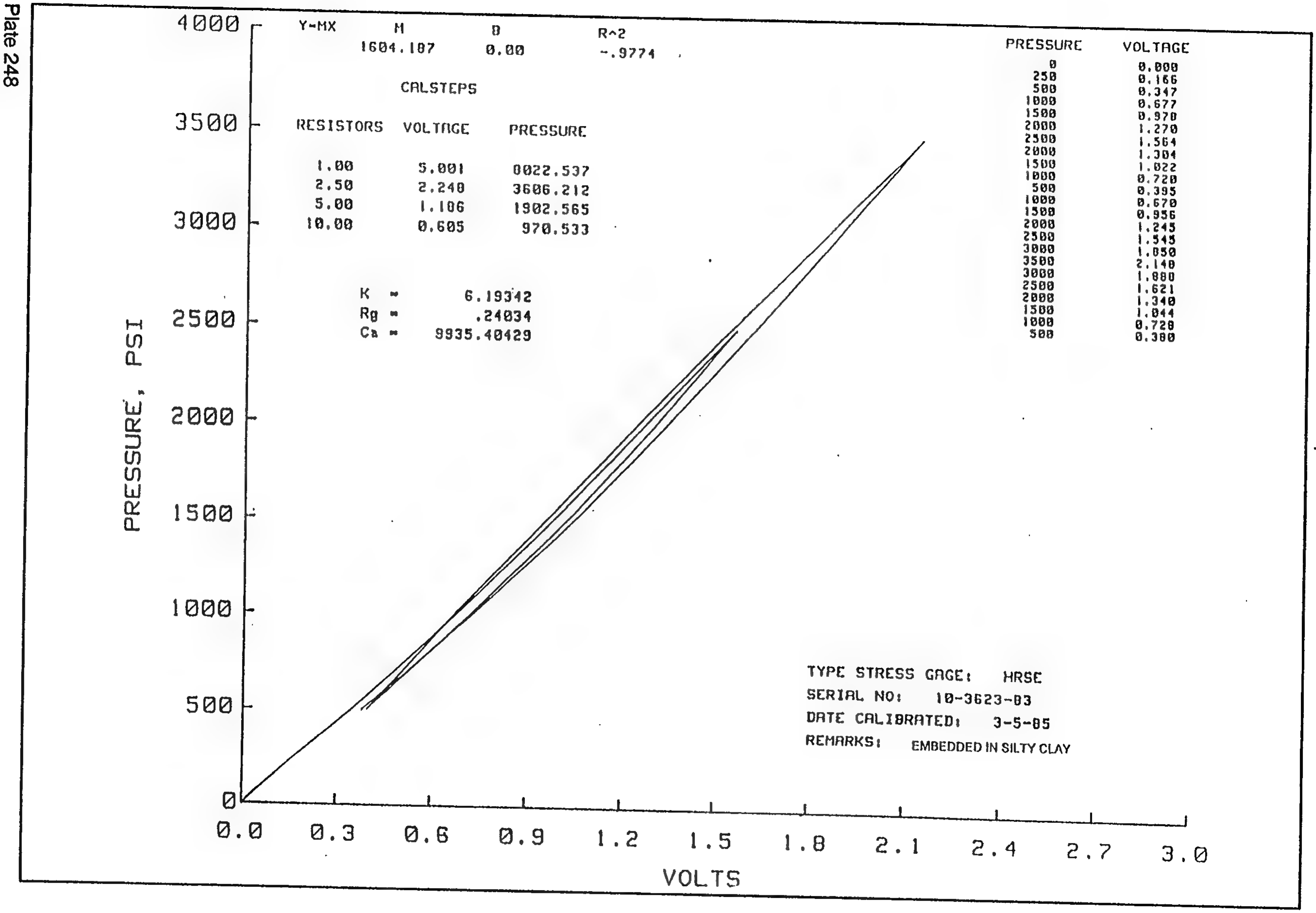
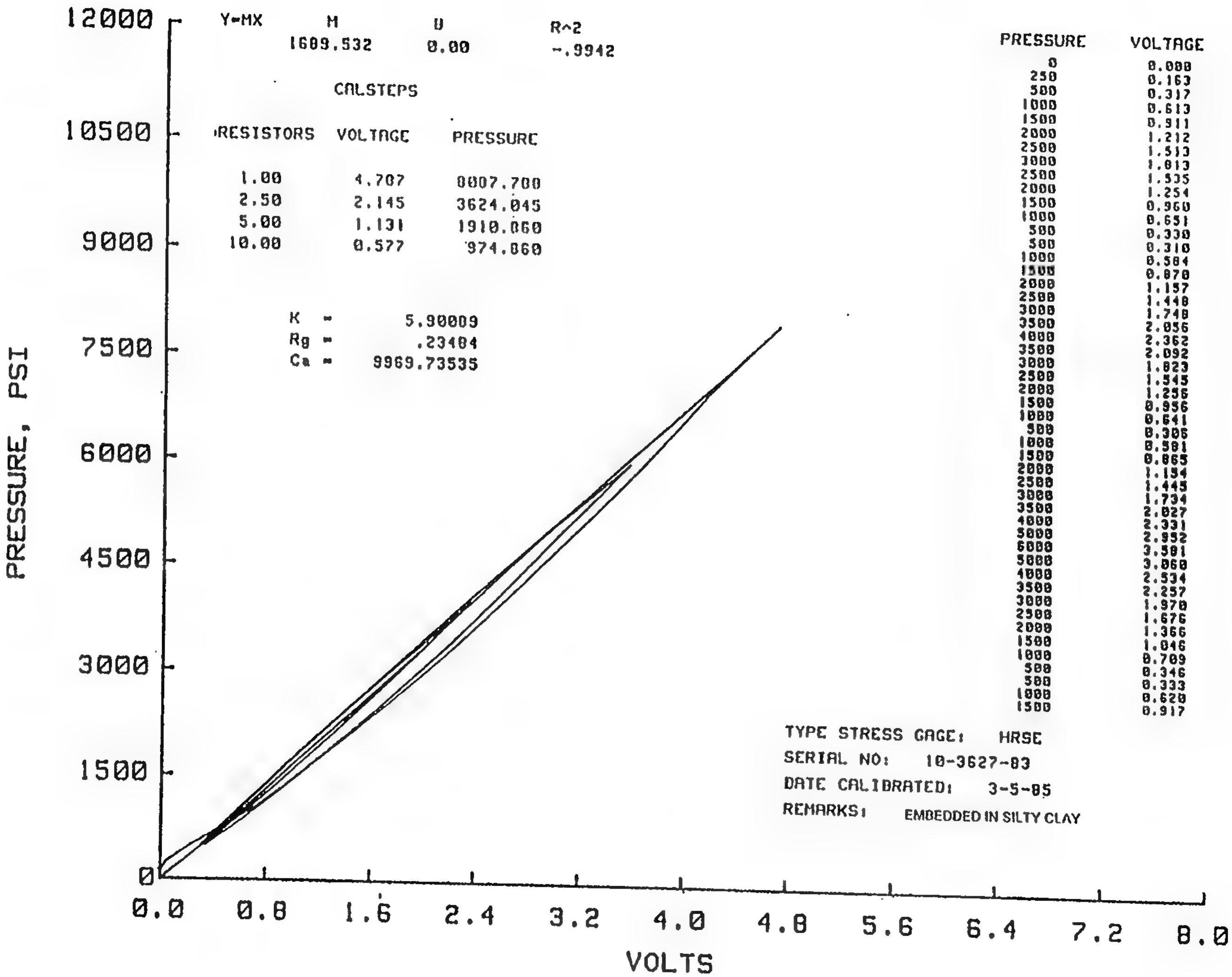

Y-MX M B R^2
1604.187 0.00 -.9774
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.001 0022.537
2.50 2.240 3606.212
5.00 1.106 1902.565
10.00 0.605 970.533
K = 6.19342
Rg = .24034
Ca = 9935.40429
PRESSURE VOLTAGE
0 0.000
250 0.166
500 0.347
1000 0.677
1500 0.970
2000 1.270
2500 1.564
2000 1.304
1500 1.022
1000 0.720
500 0.395
1000 0.670
1500 0.956
2000 1.245
2500 1.545
3000 1.050
3500 2.140
3000 1.880
2500 1.621
2000 1.340
1500 1.044
1000 0.720
500 0.380
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3623-03
DATE CALIBRATED: 3-5-85
REMARKS: EMBEDDED IN SILTY CLAY
PRESSURE, PSI
0
500
1000
1500
2000
2500
3000
3500
4000
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
3.0
VOLTS

Plate 248



Y=MX	M	B	R^2
	1689.532	0.00	-.9942

CALSTEPS

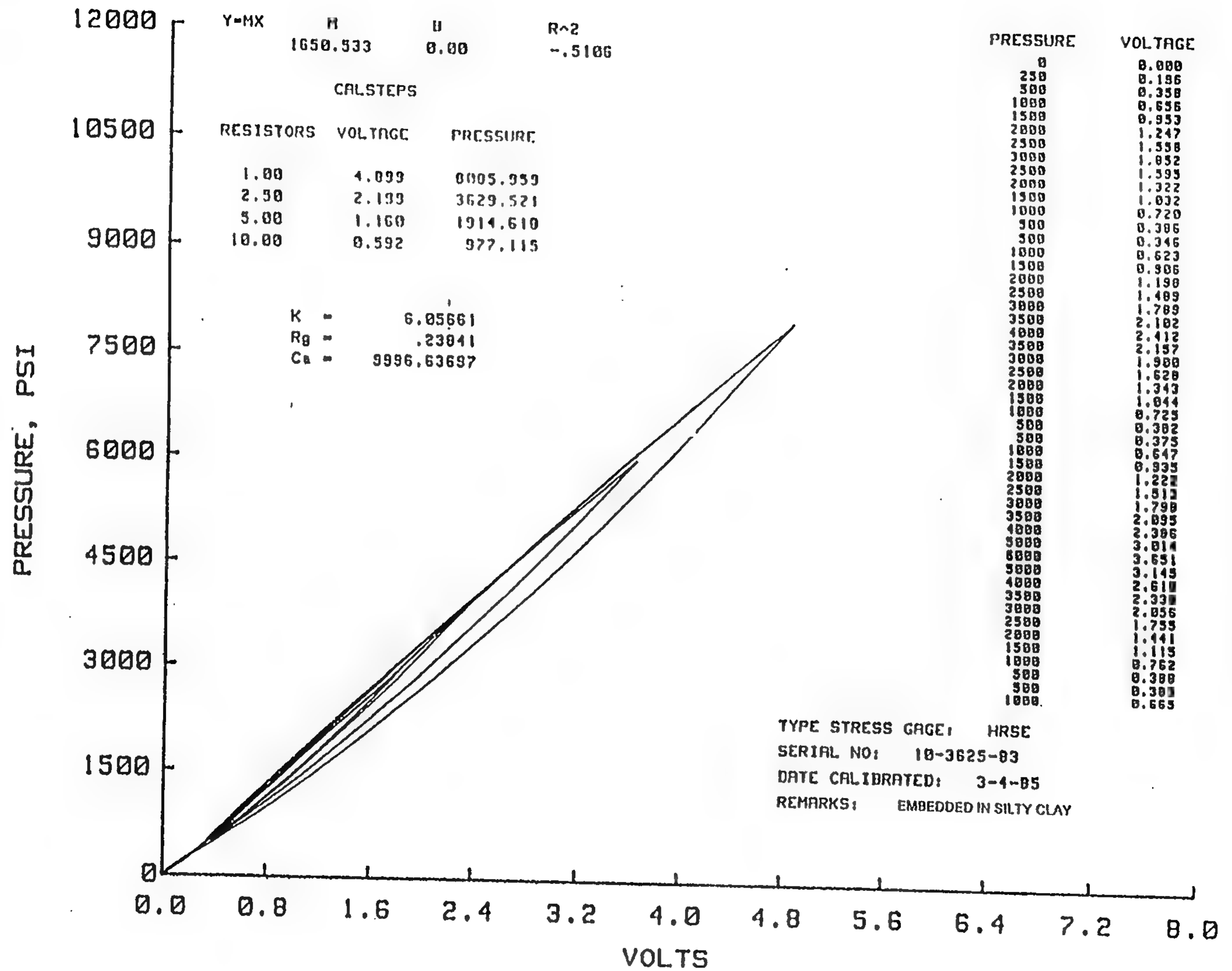
RESISTORS	VOLTAGE	PRESSURE
1.00	4.707	8007.700
2.50	2.145	3624.045
5.00	1.131	1910.060
10.00	0.577	974.860

K = 5.90009
Rg = .23484
Ca = 9969.73535

PRESSURE	VOLTAGE
0	0.000
250	0.163
500	0.317
1000	0.613
1500	0.911
2000	1.212
2500	1.513
3000	1.813
2500	1.535
2000	1.254
1500	0.960
1000	0.651
500	0.330
500	0.310
1000	0.584
1500	0.870
2000	1.157
2500	1.440
3000	1.740
3500	2.056
4000	2.362
3500	2.092
3000	1.823
2500	1.545
2000	1.256
1500	0.956
1000	0.641
500	0.306
1000	0.581
1500	0.865
2000	1.154
2500	1.445
3000	1.734
3500	2.027
4000	2.331
5000	2.952
6000	3.581
5000	3.060
4000	2.534
3500	2.257
3000	1.970
2500	1.676
2000	1.366
1500	1.046
1000	0.709
500	0.346
500	0.333
1000	0.620
1500	0.917

PRESSURE	VOLTAGE
2000	1.212
2500	1.505
3000	1.790
3500	2.009
4000	2.376
5000	2.954
6000	3.537
7000	4.140
8000	4.727
7000	4.174
6000	3.692
5000	3.167
4000	2.609
3500	2.320
3000	2.024
2500	1.713
2000	1.384
1500	1.040
1000	0.679
500	0.227
250	0.044
0	-.048

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3627-83
DATE CALIBRATED: 3-5-85
REMARKS: EMBEDDED IN SILTY CLAY



Y=MX	M	B	R^2
	1650.533	0.00	-.5106

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.099	8005.959
2.50	2.199	3629.521
5.00	1.160	1914.610
10.00	0.592	977.115

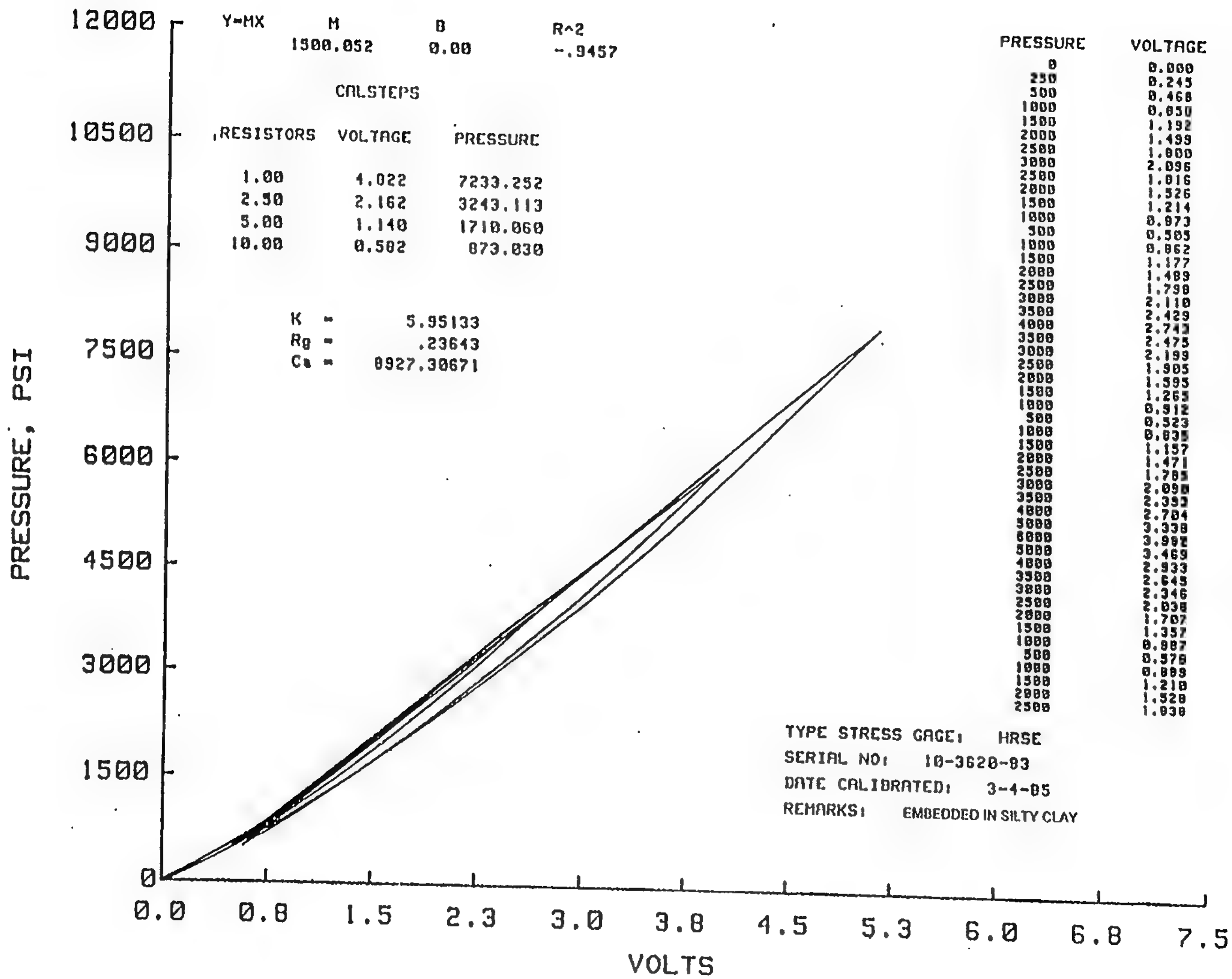
K = 6.05661
Rg = .23041
Ca = 9996.63697

PRESSURE	VOLTAGE
0	0.000
250	0.196
500	0.358
1000	0.656
1500	0.953
2000	1.247
2500	1.558
3000	1.852
2500	1.595
2000	1.322
1500	1.032
1000	0.720
500	0.306
500	0.346
1000	0.623
1500	0.906
2000	1.198
2500	1.489
3000	1.789
3500	2.102
4000	2.412
3500	2.157
3000	1.900
2500	1.620
2000	1.343
1500	1.044
1000	0.725
500	0.382
500	0.375
1000	0.647
1500	0.935
2000	1.22[illegible]
2500	1.51[illegible]
3000	1.790
3500	2.095
4000	2.386
5000	3.014
6000	3.651
5000	3.145
4000	2.61[illegible]
3500	2.33[illegible]
3000	2.056
2500	1.755
2000	1.441
1500	1.115
1000	0.762
500	0.380
500	0.38[illegible]
1000.	0.665

PRESSURE	VOLTAGE
1500	0.959
2000	1.254
2500	1.550
3000	1.848
3500	2.129
4000	2.415
5000	2.990
6000	3.594
7000	4.225
8000	4.070
7000	4.373
6000	3.007
5000	3.359
4000	2.800
3500	2.504
3000	2.199
2500	1.800
2000	1.547
1500	1.194
1000	0.822
500	0.415
250	0.180
0	-.010

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3625-83
DATE CALIBRATED: 3-4-85
REMARKS: EMBEDDED IN SILTY CLAY

Plate 250



Y=MX	M	B	R^2
	1500.052	0.00	-.9457

CALSTEPS

,RESISTORS	VOLTAGE	PRESSURE
1.00	4.022	7233.252
2.50	2.162	3243.113
5.00	1.140	1710.060
10.00	0.582	873.030

K = 5.95133
Rg = .23643
Ca = 8927.30671

PRESSURE	VOLTAGE
0	0.000
250	0.245
500	0.468
1000	0.850
1500	1.192
2000	1.499
2500	1.800
3000	2.096
2500	1.816
2000	1.526
1500	1.214
1000	0.873
500	0.505
1000	0.862
1500	1.177
2000	1.489
2500	1.790
3000	2.110
3500	2.429
4000	2.743
3500	2.475
3000	2.199
2500	1.905
2000	1.595
1500	1.265
1000	0.912
500	0.523
1000	0.835
1500	1.157
2000	1.471
2500	1.785
3000	2.090
3500	2.393
4000	2.704
5000	3.338
6000	3.992
5000	3.469
4000	2.933
3500	2.645
3000	2.346
2500	2.038
2000	1.707
1500	1.357
1000	0.987
500	0.578
1000	0.889
1500	1.218
2000	1.528
2500	1.938

PRESSURE	VOLTAGE
3000	2.146
3500	2.444
4000	2.741
5000	3.329
6000	3.920
7000	4.523
8000	5.148
7000	4.621
6000	4.118
5000	3.504
4000	3.011
3500	2.706
3000	2.392
2500	2.070
2000	1.719
1500	1.354
1000	0.957
500	0.527
250	0.290
0	0.035

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3620-83
DATE CALIBRATED: 3-4-85
REMARKS: EMBEDDED IN SILTY CLAY

Plate 251

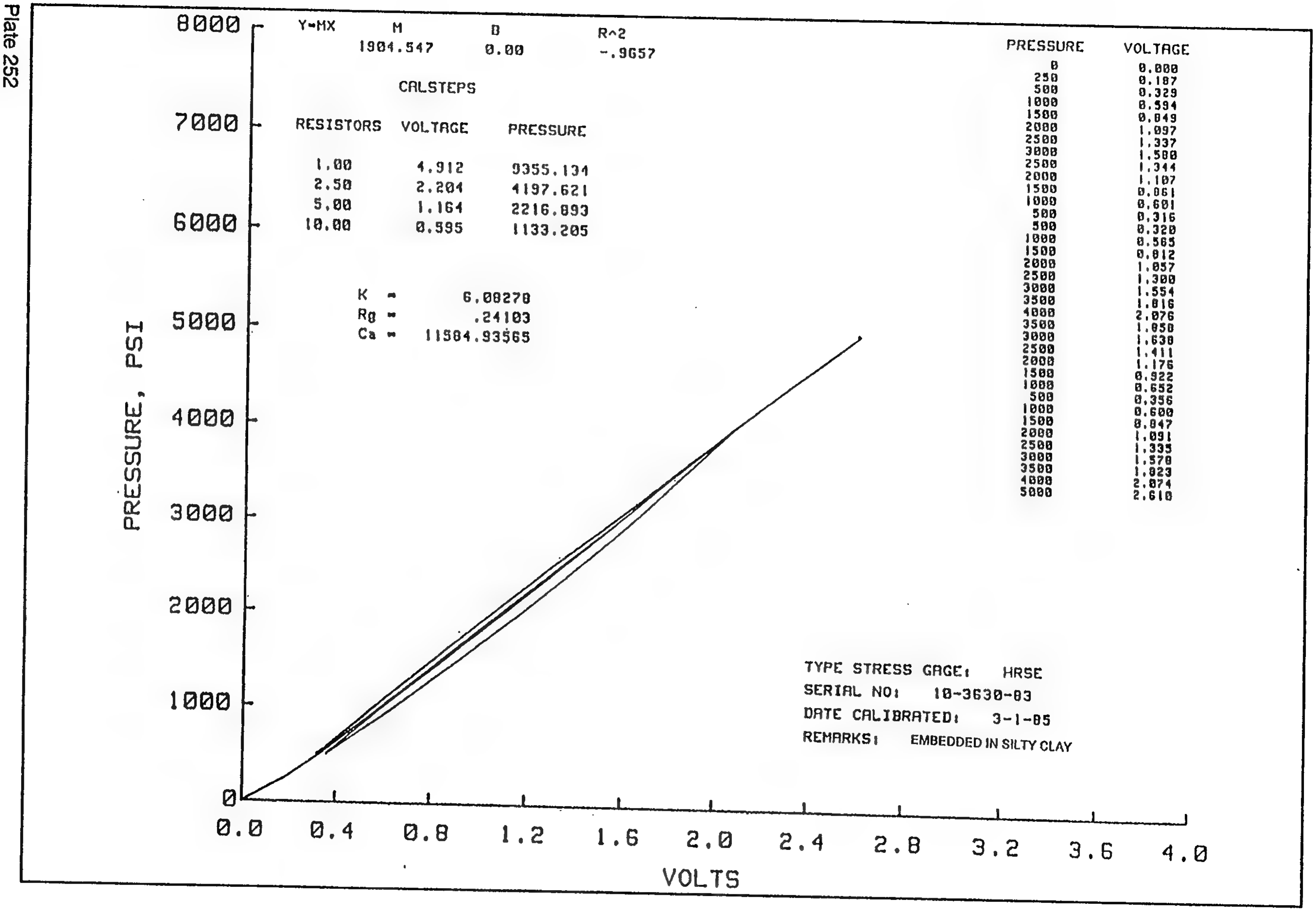
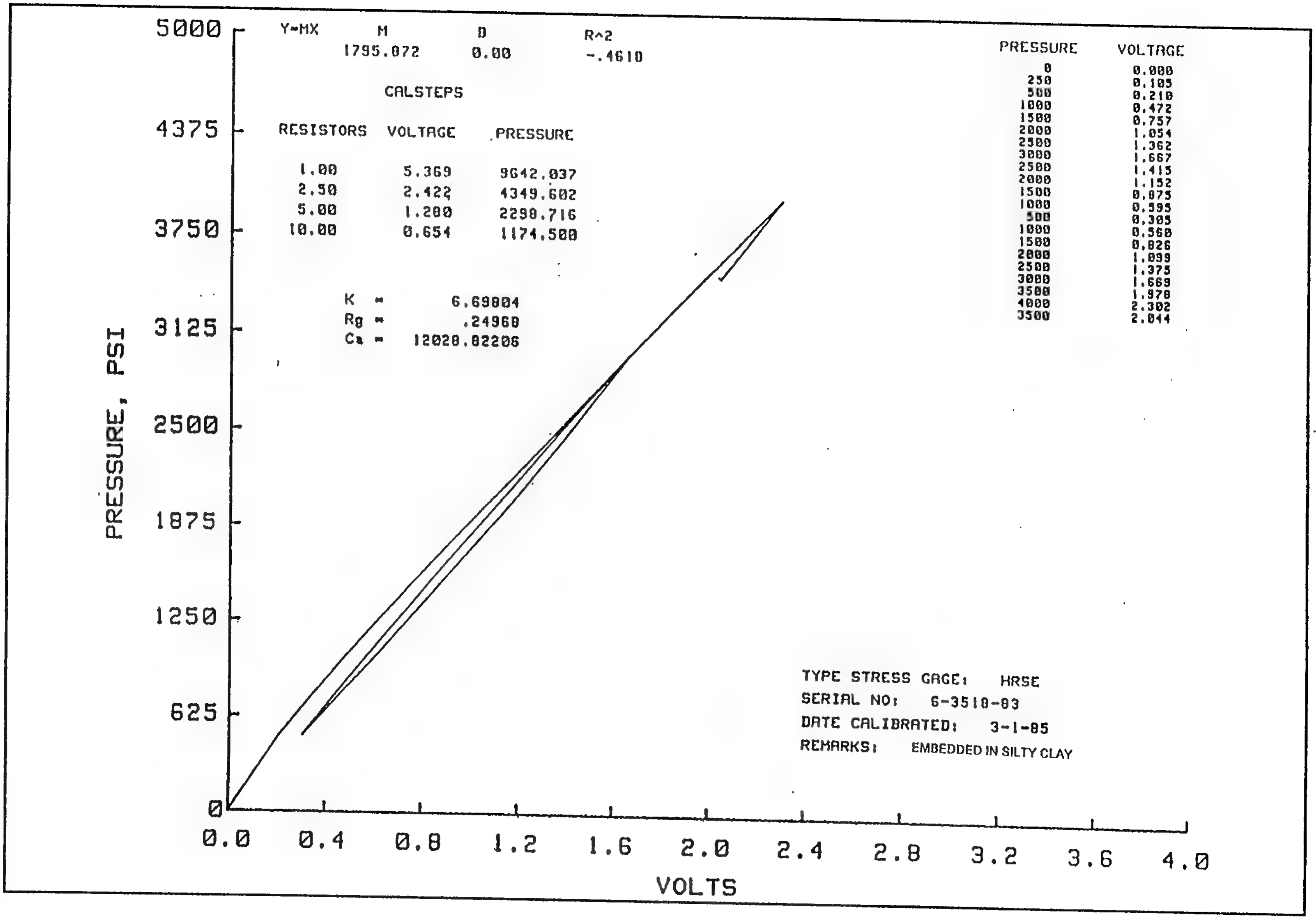

Y=MX M B R^2
1904.547 0.00 -.9657
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 4.912 9355.134
2.50 2.204 4197.621
5.00 1.164 2216.893
10.00 0.595 1133.205
K = 6.08278
Rg = .24103
Ca = 11584.93565
PRESSURE VOLTAGE
0 0.000
250 0.187
500 0.329
1000 0.594
1500 0.849
2000 1.097
2500 1.337
3000 1.580
2500 1.344
2000 1.107
1500 0.861
1000 0.601
500 0.316
500 0.320
1000 0.565
1500 0.812
2000 1.057
2500 1.300
3000 1.554
3500 1.816
4000 2.076
3500 1.850
3000 1.630
2500 1.411
2000 1.176
1500 0.922
1000 0.652
500 0.356
1000 0.600
1500 0.847
2000 1.091
2500 1.335
3000 1.570
3500 1.823
4000 2.074
5000 2.610
TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3630-03
DATE CALIBRATED: 3-1-85
REMARKS: EMBEDDED IN SILTY CLAY
PRESSURE, PSI
0
1000
2000
3000
4000
5000
6000
7000
8000
VOLTS
0.0
0.4
0.8
1.2
1.6
2.0
2.4
2.8
3.2
3.6
4.0

Plate 252



Y=MX M B R^2
1795.072 0.00 -.4610
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.369 9642.037
2.50 2.422 4349.602
5.00 1.280 2298.716
10.00 0.654 1174.500
K = 6.69804
Rg = .24960
Ca = 12020.82206
PRESSURE VOLTAGE
0 0.000
250 0.105
500 0.210
1000 0.472
1500 0.757
2000 1.054
2500 1.362
3000 1.667
2500 1.415
2000 1.152
1500 0.875
1000 0.595
500 0.305
1000 0.560
1500 0.826
2000 1.099
2500 1.375
3000 1.669
3500 1.978
4000 2.302
3500 2.044
TYPE STRESS GAGE: HRSE
SERIAL NO: 6-3518-83
DATE CALIBRATED: 3-1-85
REMARKS: EMBEDDED IN SILTY CLAY
PRESSURE, PSI
5000
4375
3750
3125
2500
1875
1250
625
0
0.0
0.4
0.8
1.2
1.6
2.0
2.4
2.8
3.2
3.6
4.0
VOLTS

Plate 253

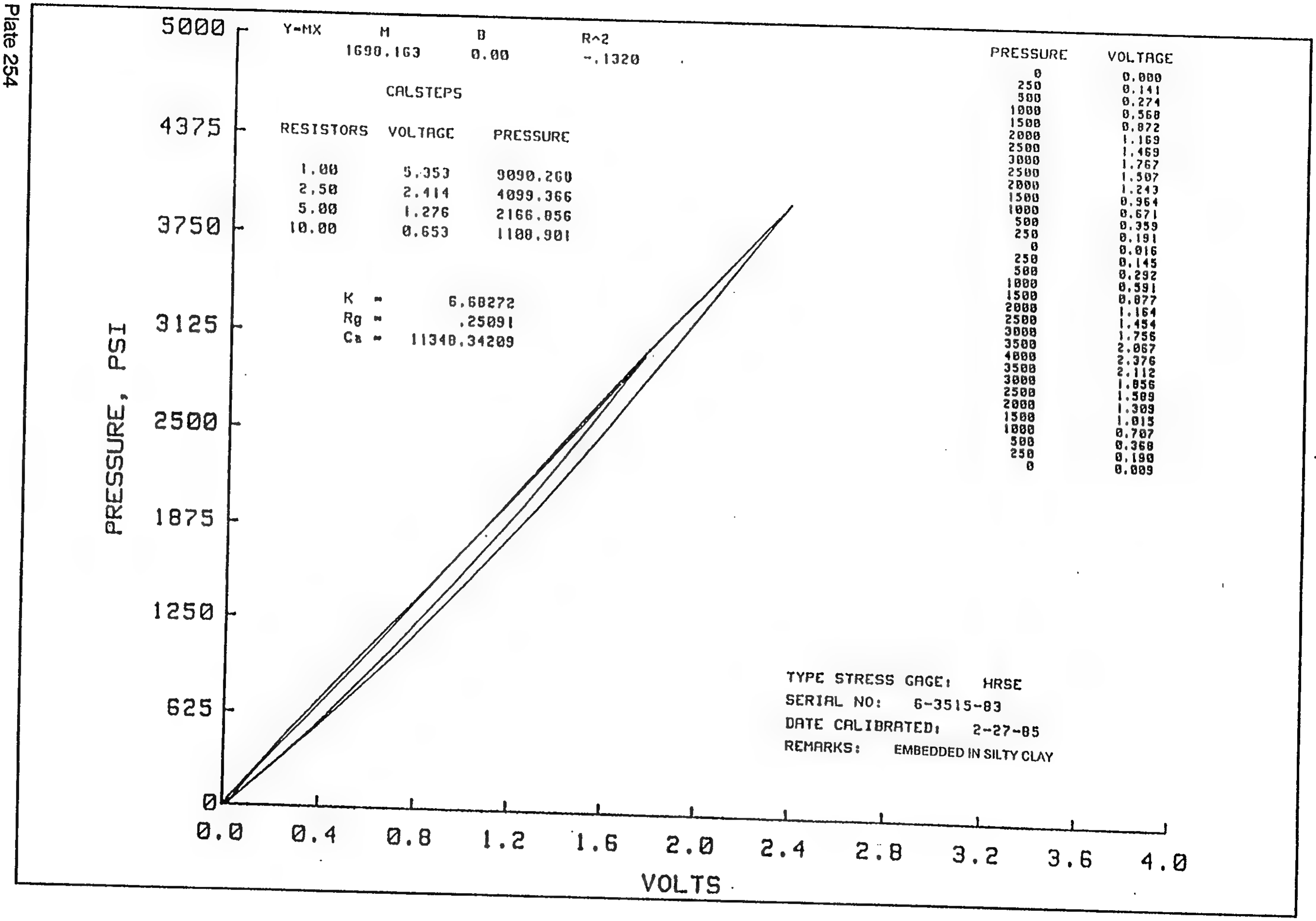
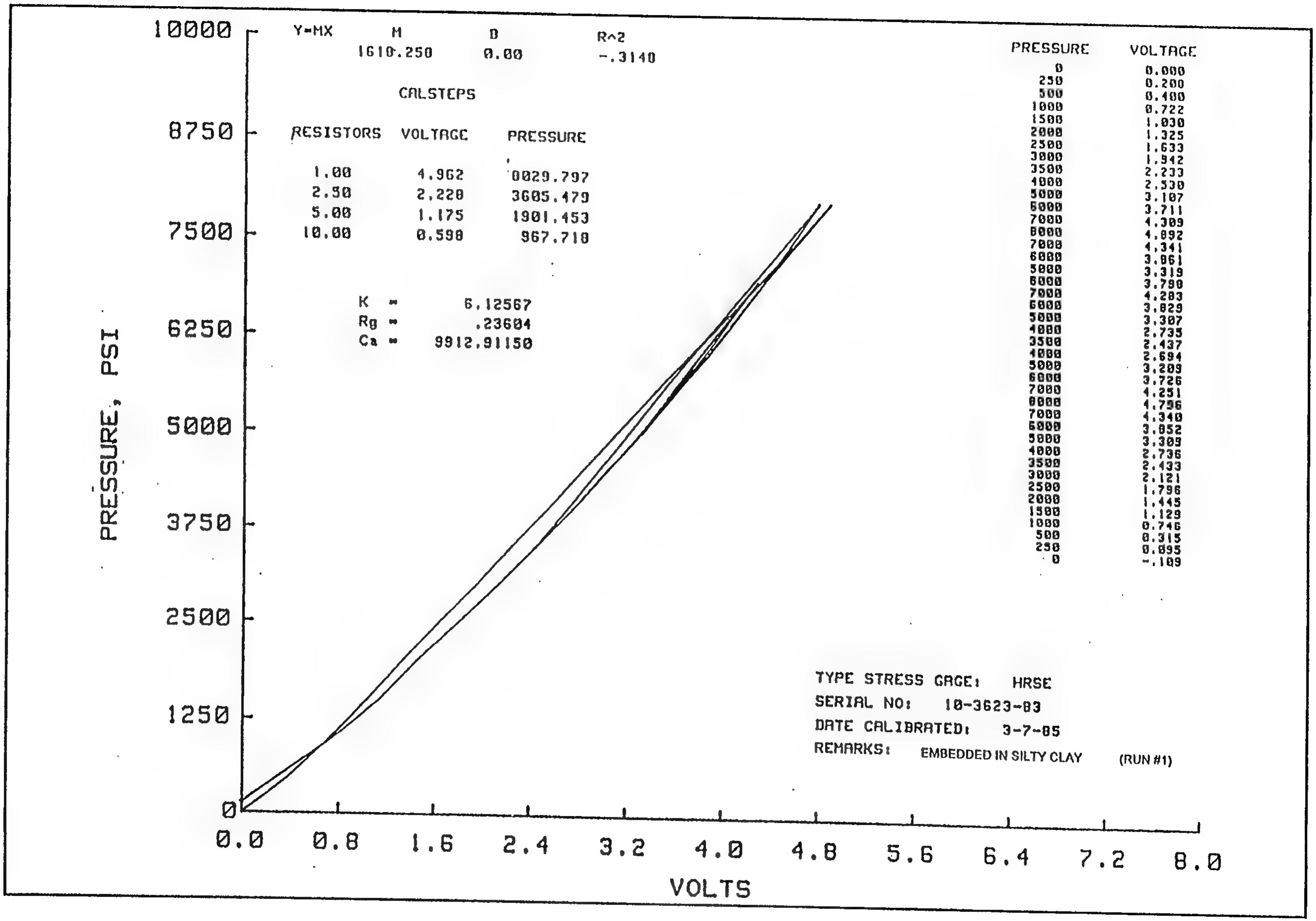

Y=MX
M
1690.163
B
0.00
R^2
-.1320
CALSTEPS
RESISTORS VOLTAGE PRESSURE
1.00 5.353 9090.260
2.50 2.414 4099.366
5.00 1.276 2166.056
10.00 0.653 1108.901
K = 6.68272
Rg = .25091
Ca = 11340.34209
PRESSURE VOLTAGE
0 0.000
250 0.141
500 0.274
1000 0.568
1500 0.872
2000 1.169
2500 1.469
3000 1.767
2500 1.507
2000 1.243
1500 0.964
1000 0.671
500 0.359
250 0.191
0 0.016
250 0.145
500 0.292
1000 0.591
1500 0.877
2000 1.164
2500 1.454
3000 1.756
3500 2.067
4000 2.376
3500 2.112
3000 1.856
2500 1.589
2000 1.309
1500 1.015
1000 0.707
500 0.368
250 0.190
0 0.009
TYPE STRESS GAGE: HRSE
SERIAL NO: 6-3515-83
DATE CALIBRATED: 2-27-85
REMARKS: EMBEDDED IN SILTY CLAY
PRESSURE, PSI
5000
4375
3750
3125
2500
1875
1250
625
0
0.0
0.4
0.8
1.2
1.6
2.0
2.4
2.8
3.2
3.6
4.0
VOLTS

Plate 254



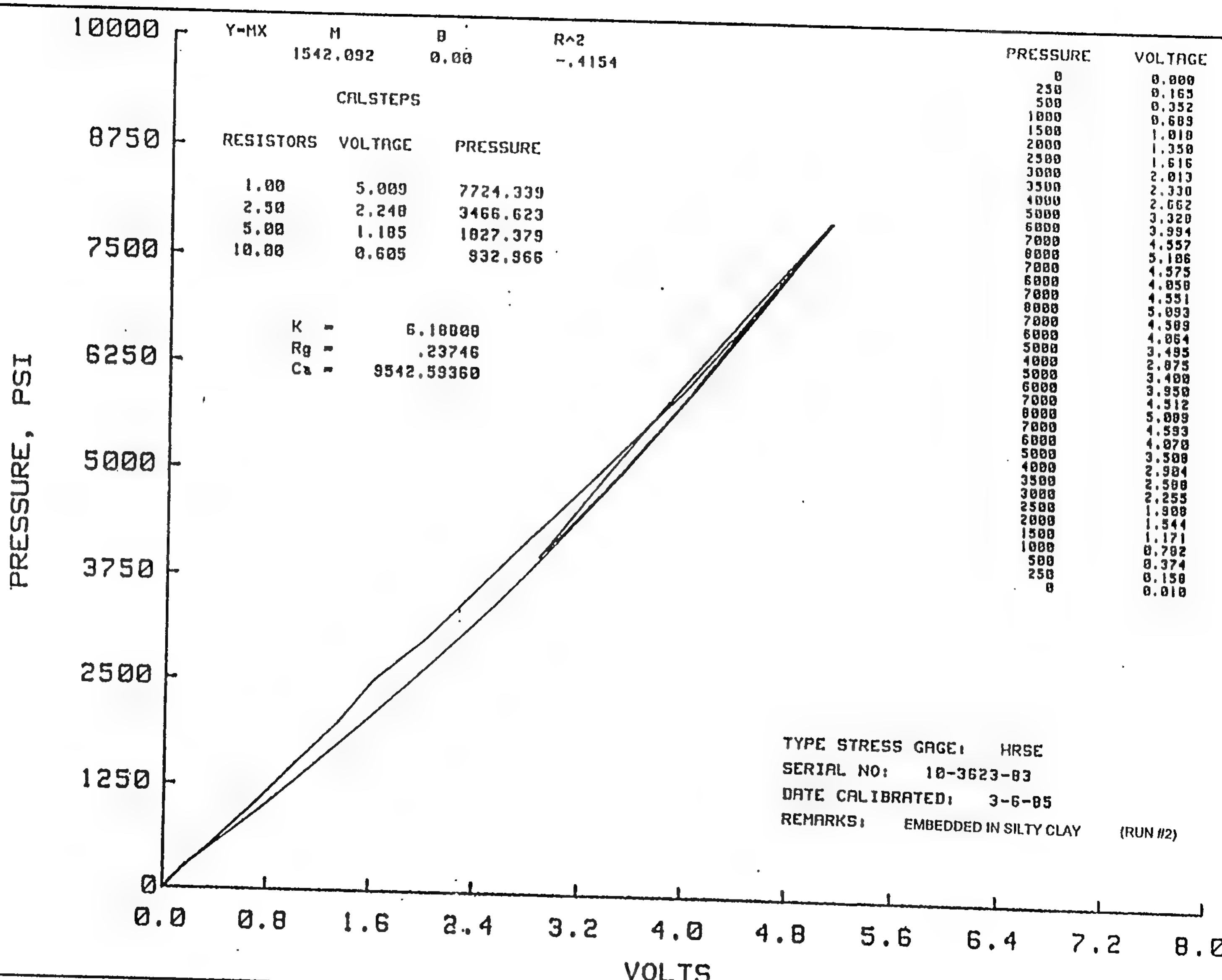
Y=MX	M	B	R^2
	1610.250	0.00	-.3140

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.962	8029.797
2.50	2.220	3605.479
5.00	1.175	1901.453
10.00	0.598	967.710

K = 6.12567
Rg = .23604
Ca = 9912.91150

PRESSURE	VOLTAGE
0	0.000
250	0.200
500	0.400
1000	0.722
1500	1.030
2000	1.325
2500	1.633
3000	1.942
3500	2.233
4000	2.530
5000	3.107
6000	3.711
7000	4.309
8000	4.892
7000	4.341
6000	3.861
5000	3.319
6000	3.790
7000	4.283
6000	3.829
5000	3.307
4000	2.735
3500	2.437
4000	2.694
5000	3.209
6000	3.726
7000	4.251
8000	4.796
7000	4.340
6000	3.852
5000	3.309
4000	2.736
3500	2.433
3000	2.121
2500	1.796
2000	1.445
1500	1.129
1000	0.746
500	0.315
250	0.095
0	-.109



Y=MX	M	B	R^2
	1542.092	0.00	-.4154

CALSTEPS

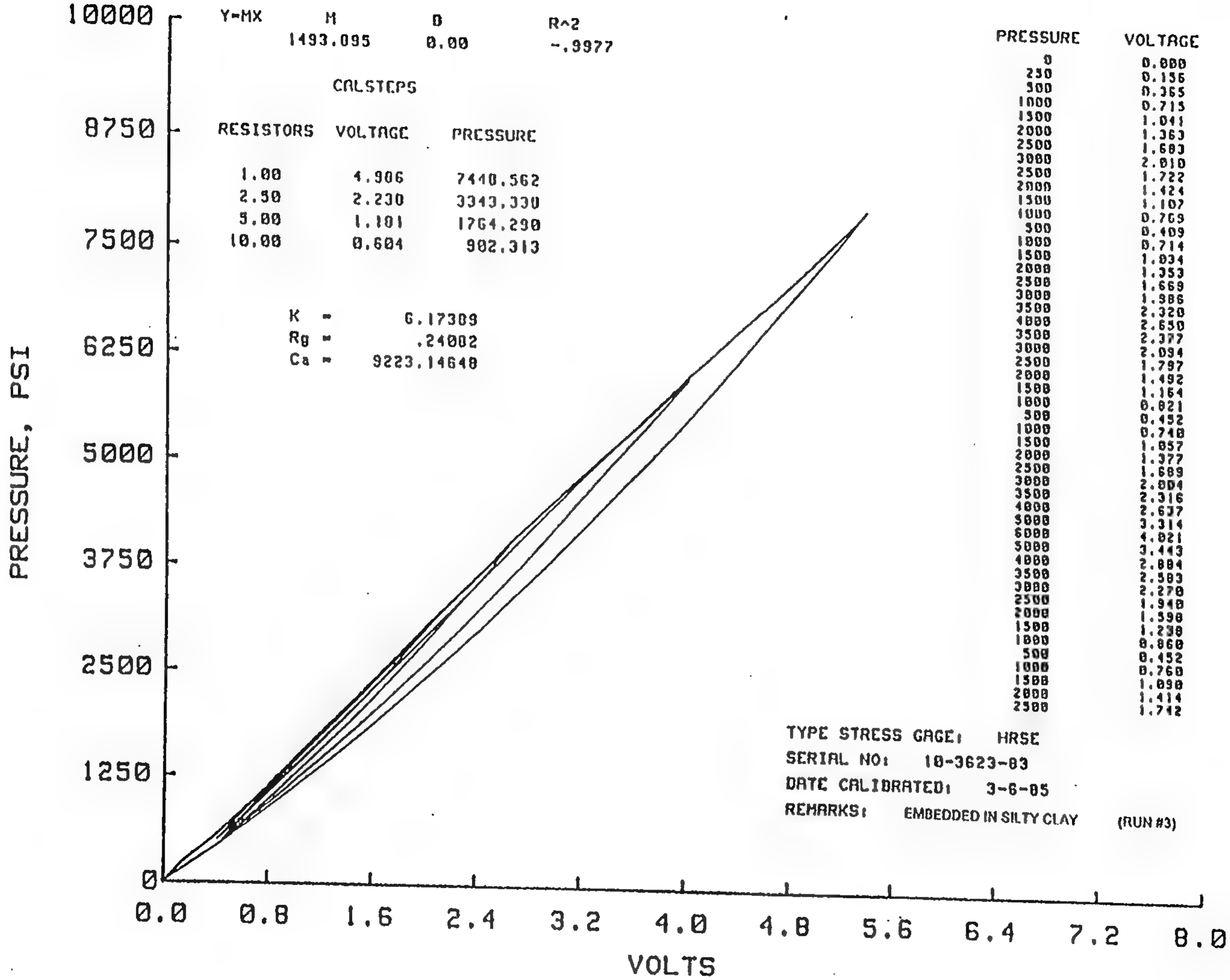
RESISTORS	VOLTAGE	PRESSURE
1.00	5.009	7724.339
2.50	2.248	3466.623
5.00	1.185	1827.379
10.00	0.605	932.966

K = 6.18000
Rg = .23746
Ca = 9542.59360

PRESSURE	VOLTAGE
0	0.000
250	0.165
500	0.352
1000	0.689
1500	1.010
2000	1.350
2500	1.616
3000	2.013
3500	2.330
4000	2.662
5000	3.320
6000	3.994
7000	4.557
8000	5.106
7000	4.575
6000	4.050
7000	4.551
8000	5.093
7000	4.589
6000	4.064
5000	3.495
4000	2.875
5000	3.400
6000	3.950
7000	4.512
8000	5.009
7000	4.593
6000	4.070
5000	3.500
4000	2.904
3500	2.500
3000	2.255
2500	1.900
2000	1.544
1500	1.171
1000	0.782
500	0.374
250	0.150
0	0.010

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3623-83
DATE CALIBRATED: 3-6-85
REMARKS: EMBEDDED IN SILTY CLAY (RUN #2)

Plate 256



Y=MX	M	B	R^2
	1493.095	0.00	-.9977

CALSTEPS

RESISTORS	VOLTAGE	PRESSURE
1.00	4.906	7440.562
2.50	2.230	3343.330
5.00	1.101	1764.290
10.00	0.604	902.313

K = 6.17309
Rg = .24002
Ca = 9223.14648

PRESSURE	VOLTAGE
0	0.000
250	0.156
500	0.365
1000	0.715
1500	1.041
2000	1.363
2500	1.683
3000	2.010
2500	1.722
2000	1.424
1500	1.107
1000	0.769
500	0.409
1000	0.714
1500	1.034
2000	1.353
2500	1.669
3000	1.986
3500	2.320
4000	2.650
3500	2.377
3000	2.094
2500	1.797
2000	1.492
1500	1.164
1000	0.821
500	0.452
1000	0.748
1500	1.057
2000	1.377
2500	1.689
3000	2.004
3500	2.316
4000	2.637
5000	3.314
6000	4.021
5000	3.443
4000	2.884
3500	2.583
3000	2.270
2500	1.940
2000	1.598
1500	1.238
1000	0.860
500	0.452
1000	0.760
1500	1.090
2000	1.414
2500	1.742

PRESSURE	VOLTAGE
3000	2.063
3500	2.300
4000	2.699
5000	3.330
6000	3.995
7000	4.716
8000	5.300
7000	4.032
6000	4.205
5000	3.702
4000	3.003
3500	2.757
3000	2.423
2500	2.065
2000	1.702
1500	1.318
1000	0.905
500	0.475
250	0.234
0	-.015

TYPE STRESS GAGE: HRSE
SERIAL NO: 10-3623-83
DATE CALIBRATED: 3-6-85
REMARKS: EMBEDDED IN SILTY CLAY (RUN #3)

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Walton C. Dickson, Jon E. Windham

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Soil stress measurements are used to determine or deduce many aspects of high-explosive (HE) tests; hence, accurate calibrations of soil stress gages are essential to proper interpretation of test events. The soil stress gages typically used in HE tests are currently calibrated hydrostatically. The result of a hydrostatic is linear for both loading and unloading. But soils do not typically behave as linear elastic materials, i.e., soil stress-strain behavior calibration is usually both nonlinear and hydrostatic. A calibration technique is needed to convert the voltage output of a soil stress gage to a pressure based upon the soil backfill material in which the gage is embedded.

Calibration tests were conducted on low-range (to 30 MPa) and high-range (to 70 MPa) diaphragm-type soil stress gages, denoted LRSE and HRSE, respectively, immersed in oil and embedded in soil. Three soil types were used: (1) flume sand, SP, (2) Yuma clayey sand, SC, and (3) Vicksburg loess (silty clay), CL. Calibration tests were conducted in which the voltage output of the gages was recorded. Stress gage calibration tests were also conducted in which the strain output from each of the four individual strain gages in the wheatstone bridge were recorded. The gages were oriented for both vertical and horizontal stress measurements, and calibration tests were conducted on the gages with and without confining rings. The soil-imbedded calibration test results may be used to process raw stress gage data from field tests more accurately than can be achieved using standard oil-immersed calibrations. The results from the strain output tests can be directly compared with the results from finite element gage-simulation calculations.

14. SUBJECT TERMS

Flume sand	Oil-immersed calibration tests	Yuma clayey sand
High-explosive (HE field tests)	Soil-imbedded calibration tests	
HRSE gage	Soil stress gage	
LRSE gage	Vicksburg loess (silty clay)	

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